The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Volume XVIII | MAY, 1945 | Number 5

MELLON INSTITUTE
LIBRARY
MAY 28 945
PITTSBURGH, PA.

Savings by Triplexing Shown in Reagan's Talk on Electric Steel

Reported by G. Derge
Metals Research Laboratory, Carnegie Institute of Technology

Pittsburgh Chapter honored a past chairman's return visit with a record wartime attendance at the April 12th meeting. W. J. Reagan, now research metallurgist for the Alloy Steel Division of the Copperweld Steel Co., Warren, Ohio, discussed "Electric Furnace Alloy Steelmaking Practice."

The maintenance of quality in the electric furnace begins with the careful selection of the charge, Mr. Reagan pointed out. This applies not only to chemical analysis but to the sizing and distribution of the scrap as it is placed in the furnace. This distribution is particularly important from an economic standpoint as it determines melting time and also alloy recovery. The melting time is actually the factor which controls the overall heat time in most cases.

Slag and Metal Tests Taken

Tests are taken for chemical and spectrographic analysis as soon as the charge has been melted and the heat is then refined under the oxidizing slag. Additional slag and metal tests are taken and the slag is changed to a reducing slag. It is particularly important at this point to rake off the oxidizing slag as completely as possible. Under the reducing slag final alloy additions are made and almost 100% recovery is achieved. Aluminum deoxidation is made just before the heat is poured.

Special precautions are taken during pouring and careful attention is given to mold conditions. Some type of coating such as dry pitch is always used. The importance of this is indicated by the fact that 30% of the conditioning costs can be related to the success of the mold coating. The average heat time is 6 hr. from tap to tap and 550 kw. power is consumed per ton of ingot produced.

The pioneering experiences of Copperweld in triplexing with a cupola and bessemer delivering hot metal to the electric furnace were also described. They have found that the practice of slag control in the cupola by variation of the limestone allows them to control the chemical specifications quite accurately. The cupola metal is then given a soda ash treatment and delivered to the mixer.

(Continued on Page 18)

Matched Set Method Aids Selection of Proper Tool Steel

The "matched set method" of tool steel selection, originated by metallurgists at the Carpenter Steel Co., is designed to simplify the selection of the appropriate steel for various purposes. Among the air hardening steels, for instance, there are certain steels which are best suited to provide toughness, others for wear resistance, and still another to use when each quality is needed in average degree.

This matched set method of selecting tool steels (which has been elaborated and expanded to form a classification for all types of steels, as shown by J. E. Erb of General Electric Co., in METAL PROGRESS, April 1945, page 724) is described in a new folder on air hardening tool steels recently issued by the Carpenter Steel Co., 333 West Bern St., Reading, Pa.

The three air hardening tool steels described in this folder help to reduce tool room troubles caused by breakage, warpage and size change. The slow, uniform cooling of these steels virtually eliminates internal stresses. Grinding, stoning, lapping, fitting and straightening operations are reduced to a minimum. This, plus the fact that the air hardening tool steels are deep hardening and can therefore be reground many times, contributes to considerable savings in tool room costs.

Mention R901 When Writing or Using Reader Service

Additional Catalogs Listed on Page 20

Compliments

To GUNTHER MOHLING of Allegheny Ludlum Steel Corp. on the presentation of a cash award and a certificate of appreciation by the board of directors of Allegheny Ludlum for his contribution in the development of a series of high temperature alloys, one of which provides a vital link in American jet propulsion aircraft production.

- * -

To the HANSON-VAN WINKLE-MUNING Co., Matawan, N. J., on the award of a Golden Anniversary Certificate from the National Association of Manufacturers as a founding company which has been outstanding in contributing to American industrial progress.

- * -

To WALDEMAR NAUJOKS, chief engineer, Steel Improvement and Forge Co., chairman, Cleveland Chapter A. S. M., on his election as treasurer of the Cleveland Technical Societies Council for 1945-46.

- * -

To E. K. SMITH, metallurgical specialist, C.U. Division, U.S. Department of State, on his appointment to the Advisory Committee on Iron and Steel, War Production Board, National Government of China.

- * -

To TRACY C. JARRETT, chief metallurgist, American Hammered Piston Ring Division of the Koppers Co., Inc., on his appointment to the technical committee of the Gray Iron Founders' Society.

- * -

What's NEW..... in THE METALS REVIEW

Review of Current Metal Literature

Analysis 9
Cleaning and Finishing 5, 7
Corrosion 5
Design 15
Electroplating 7
Foundry Practice 10-11
Furnace and Fuels 11
Heat Treatment 11-12
Industrial Uses and Applications 15
Inspection and Standardization 9-10
Laboratory Apparatus, Instruments 9
Lubrication and Friction 14
Machining and Machine Tools 12-13
Materials Index 4
Miscellaneous 15
New Books 16
Powder Metallurgy 5
Properties of Metals and Alloys 4
Refractories and Furnace Materials 11
Salvage and Secondary Metals 11
Smelting and Refining 4
Statistics 15
Structure 4
Temperature Measurement and Control 10
Testing 7
Welding 14-15
Working (Rolling, Forging, etc.) 12

Other Departments

Review of Products, Equipment, Materials 17, 19
Review of Manufacturers' Catalogs 20
Employment Bureau 16
Reader Service Coupon 17
Advertising Index 20

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.	Name	Item No.

Stainless Steel Uses In Aircraft Will Grow With Better Technology

Reported by Frank Sailer
International Harvester Co., Tractor Works

Stainless steels are playing an increasingly important part in aircraft industry and will continue to do so, acording to V. N. Krivobok of the International Nickel Co., who addressed 300 members of the Chicago Chapter on the subject of "Stainless Steels for Aircraft" on March 15.

Dr. Krivobok carefully pointed out that aluminum alloys should be regarded as primarily a structural material but that the utilization of stainless is necessary for specific reasons.

If the use of stainless steels at present grows at a slower rate than might be anticipated, it might, in part, be explained by insufficient realization of the importance of the technology of stainless and the fact that engineering specifications have not been so prepared as to produce the best available properties in this valuable material. The latter was considered by Mr. Krivobok as a definite deficiency and he suggested that metallurgists, as well as the design engineers, should strive to correct it.

Problems in Fabrication a Factor

The outstanding characteristic of stainless steels, namely, their resistance to oxidation at high temperatures, renders these steels the only ones suitable for certain uses.

It is not generally recognized, but a large number of parts in aircraft are made of stainless steels; however, the selection of stainless for these parts is not necessarily based on structural strength. In certain applications where strength requirements would justify the use of stainless, other problems of the industry make it obligatory to approach the selection of materials on the basis of what would be gained in the way of "overall" advantages. Problems of production (fabrication) of the parts are an important factor in evaluating the problem.

Mr. Krivobok discussed at length the relationships between chemical composition and physical properties as well as other important factors. Speaking principally of the chromium-nickel type of stainless, he

(Continued on Page 18)

Professorship of Light Metals Endowed By Aluminum Co. at Carnegie Tech

Establishment of a professorship of light metals in the department of metallurgical engineering at Carnegie Institute of Technology has been made possible by a grant of $200,000 to the endowment fund of the Institute by the Aluminum Co. of America.

According to President Robert E. Doherty of Carnegie Tech, the establishment of this professorship is a most significant step in the development of scientific knowledge of light metals and in the field of metallurgical engineering education. The grant is being made, said Roy A. Hunt, president of the Aluminum Company, in appreciation not only of the work being done by the department of metallurgical engineering in its regular courses, but particularly of its development of a night school which has made it possible for many young men to gain an education while working.

New Instrument Society Organized

A new national organization to be known as the Instrument Society of America is at present in course of formation. The third meeting of the conference for formation of the society was held in Pittsburgh on April 28 and the declaration of policies of the new society was published in the April issue of the magazine *Instruments*. Membership applications and inquiries may be made to Richard Darnell, recording secretary for the organizing activity, Box 4730, Washington, D. C.

Georgia Has Trustee at Officers' Luncheon

A.S.M. National Trustee Arthur E. Focke attended the luncheon given April 2 by the Georgia Chapter honoring officers and executive committeemen and nominees. Left to right, standing, are J. R. Bynum, entertainment chairman; C. M. Jenkins, by-laws chairman; J. P. Riffle, committeeman-at-large; W. P. Rocker, retiring program chairman and new vice-chairman; F. P. Alderman, retiring arrangements chairman and new membership chairman; Britt Pendergrast, Jr., program chairman; O. M. Harrelson, university chairman; E. V. Dunbar, finance chairman. Seated are E. P. Cauldwell, by-laws chairman; F. D. Brosnan, treasurer; O. K. Weatherwax, retiring vice-chairman and new chairman; National Trustee A. E. Focke; D. D. Beach, retiring chairman; M. F. Wiedl, secretary; Alva S. Wilson, retiring attendance chairman and new arrangements chairman; Bruce Moran, publicity chairman.

Effects of Alloys in Aluminum Found by Individual Study

Reported by E. V. Ivanso
Metallurgical Engineer, Steel Sales Corp.

The multiplicity of aluminum alloys now in existence, particularly in the cast form, has emphasized the desirability of formulating some generalizations upon the effects of the various elements contained. This deficiency was largely rectified by Walter Bonsack, director of laboratories, The National Smelting Co., in his talk on "Effect of Impurities on Properties of Aluminum" given before a joint meeting of the Detroit units of the American Society for Metals and the American Institute of Mining and Metallurgical Engineers on March 12.

Practically every metallic element is a potential impurity or alloying element for aluminum, even in the minute spectrographic ranges. Since commercial aluminum alloys are never pure, it becomes extremely important to know what other elements are present and what their effects on the desired properties are.

Here the impossibility of generalization has led to considerable study and research. Where the addition of a given element has the desired effect on one certain alloy combination, it may have the opposite effect on a slightly different combination, or it may have the desired effect on one or more properties but an adverse effect on others.

Mr. Bonsack has been engaged in cataloging a vast array of case histories on various aluminum alloy combinations, and in his lecture gave a number of interesting examples illustrating the diverse and unexpected results encountered. To ascertain the effect of an element or impurity on aluminum alloys, one has apparently no recourse but to study each case individually.

Almen Cites Car Wheels as Example Of Useful Compression Strength

Reported by R. R. Robinson
Technical Engineer, Colorado Fuel & Iron Corp.

How the method of strengthening metals used by the old-time blacksmith with his ball-peen hammer has been adapted to present day machine-treatment of metals, was described to members of the Pueblo Group, Rocky Mountain Chapter, A.S.M., in March.

J. O. Almen, head of Mechanical Engineering Department, General Motors Research Laboratories, was the speaker. Instead of using hammers, the method is to subject the article to a "rain" of glass or chilled iron shot, which increases its fatigue strength. His talk has been reported previously when presented before other chapters of the Society.

Dr. Almen told how he had spent part of the afternoon inspecting car wheels in the local railroad yards, and remarked that a railway car wheel cannot fail as long as compression stress exists. He gave examples of various objects where surface cracks have occurred, but where the cracks—contrary to textbook theory—failed to spread beyond the surface because of the compression underneath. Hence, the fundamental strength of the object was unimpaired.

Information for Shop Man Given in Tool Steel Talk

Reported by John R. Dobie
Heat Treat Foreman, American Steel & Wire Co.

A. H. d'Arcambal of Pratt and Whitney Division of Niles Bement-Pond Co., gave a talk March 14 in Worcester to A. S. M. members and their guests, the Tool Engineers. Mr. d'Arcambal, as is his habit, gave a lot of worthwhile, down-to-earth information that could be taken back to the shop and used on the subject of "Tool Steels and Tool Heat Treatment."

Mr. d'Arcambal likes 18-4-1 high speed steel because it is reliable and time tested. He does not intend to be forced to use another type unless it is definitely proved to be superior in cutting qualities.

The use of molybdenum high speed steel during the war made it necessary to purchase Ajax triple pot units. These were found to be capable of handling greater quantities of work and have, therefore, been retained even after the government release on 18-4-1. The second draw is as much of a must as a "must directive".

Nitriding has its pros and cons but all high speed reamers should be nitrided. Experience has proved that the life is increased at least 100%.

Chromium plating has its points. Tricks in honing, depth of plate, and other factors can give varying results. It is not a new treatment and has only limited applications so far as cutting tools are concerned.

On the much discussed subject of cold treatment Mr. d'Arcambal stated flatly that he and his associates had made extensive tests and had found no increase in life on any high speed steel cutting tools so treated. In concluding, he also displayed some results which apparently blasted the theory that sub-zero treatment will compensate for errors in heat treatment; in no case was the Rockwell hardness of the high speed tools increased.

Robert S. Heald, works manager, Heald Machine Co., preceded Mr. d'Arcambal's talk with a description of the development of his firm. He showed a picture of a ledger for the years 1826 to 1837 used by his great-grandfather for recording repairs on neighbors' plow parts and ox yokes. From these beginnings he traced the gradual growth through wars and depressions to the company's present position as one of the most important of the city's going concerns.

X-Ray Applications Include Inspection Of 60-Ton Ordnance Castings

Some applications of X-ray in industry and at war were described and illustrated with slides by E. Dale Trout before an enthusiastic gathering of the British Columbia Chapter of the A.S.M. on Feb. 14. Innumerable applications were described from the inspection of 60-ton ordnance castings with 2,000,000-volt machines to the elimination of imperfect citrus fruit in California packing houses.

The main speaker was preceded by C. Penny, manager of Mills & Packers Ltd., who gave a coffee talk outlining his conception of what part a purchasing agent or agency should play in industry in keeping costs down and quality up.

Steel Castings Defects Influenced by Design, Gas Unsoundness

Reported by W. W. Dyrkacz
Works Laboratory, General Electric Co.

Types of defects and how they can be eliminated formed the main concern of a talk on "Steel Castings" given by M. V. Healey before the April meeting of the Eastern New York Chapter A. S. M. Mr. Healey is metallurgical engineer on ferrous castings in the Schenectady Works Laboratory of the General Electric Co. These defects were divided into two classes: (*a*) Defects influenced by design, and (*b*) defects due to gas unsoundness.

The two main defects influenced by design are shrinkage and hot tears or cracks. Shrinkage is a result of the contraction of the metal upon freezing and usually amounts to 3 to 5% of the volume of the part. It is usually dentritic in nature, but the cavity may be rounded out by gases thrown off by the metal.

In simple castings, shrinkage can be eliminated by the proper use of risers. In complex castings, the use of chills, both external and internal, and padding may be necessary. Padding is the cornucopia design of a casting in such a manner as to allow for excess metal in various sections of the casting. Numerous slides were shown illustrating the use of various types of chills, padding, and cylindrical and triangular cores to eliminate or minimize shrinkage in X, Y, T, and L sections of castings.

Hot tears or cracks usually occur at internal sharp corners and are caused by stresses set up during cooling. They can be eliminated by using liberal fillets or by increasing the liquid-to-solid line thickness by means of external chills. Hot tears in non-uniform sections caused by contraction stresses can be eliminated by sine wave or wave construction in the molds.

Defects due to gas unsoundness are pinholes and blowholes caused by gases in the metal and moisture in the sand. The pinholes start about ¼ in. under the surface of the casting and extend inward for about ½ in. These defects were formerly attributed to hydrogen in the steel but now it is suspected that nitrogen plays some part as well.

Two methods of minimizing such gaseous defects are by using dry sand molds and getting rid of the hydrogen in the liquid steel by boiling (iron oxide additions producing CO_2 bubbles that rise through the melt and remove the hydrogen with them). Mr. Healey stated that the best results are obtained with melts at 1600° C. by keeping the oxygen content down by means of high silicon (approximately 0.40%) and aluminum deoxidation.

A movie entitled "Manufacture of Steel Castings" preceded Mr. Healey's talk and the meeting was closed after a brief discussion of questions from the floor.

Potentiometer and Millivolt Thermocouples Compared

Reported by Ralph W. Stahl
Lindberg Engineering Co.

The March meeting of the Indianapolis Chapter was devoted to a subject of vital and practical interest to A. S. M. members, namely, temperature measurement and control. The speaker was Walter Ellsworth, district manager of the Claud S. Gordon Co.

The early history of temperature measurement began with the ancient, expanding-liquid type of thermometers. The most accurate of modern temperature measuring systems today, Mr. Ellsworth said, are based on the use of thermocouples. He explained the fundamentals of thermocouple operation, the various types of metals employed, and the application where each combination of metals is best suited.

Discussing the operation of the millivoltmeter as applied to temperature measurement in connection with a thermocouple system, Mr. Ellsworth pointed out the importance of high internal instrument resistance so as to make the system less sensitive to external resistance changes, such as variations in lead wire length.

The most accurate means of temperature measurement with thermocouples, it was stated, involves the potentiometer instrument, which actually indicates the potential since there is no current flowing in the balanced potentiometer system. The potential gives a direct indication of the thermocouple hot junction temperature, and hence is basically more accurate than the millivolt type of instrument, which actually measures the current flowing, and is subject to errors through changes in external resistance.

New S-Curves Will Clarify Correlation With Hardenability, Aid Selection of Substitutes

Reported by H. L. Millar

As the principal speaker at the February meeting of the Los Angeles Chapter, E. S. Davenport informally discussed the "Interrupted Quench" which he chose to call "a modern interpretation of the old philosophy of heat treating." Mr. Davenport is assistant to the vice-president, research and technology, U. S. Steel Corp., Pittsburgh.

Mr. Davenport pointed out that the isothermal diagram or S-curve of steel may be regarded as a kind of map or working drawing which enables the heat treater to visualize approximately how the steel will respond to any mode of cooling from the austenitic state.

S-curves of a large variety of SAE and NE steels were compared by means of slides projected on the screen. With but one exception (cobalt) the speaker pointed out that an increase in the alloying content acts to retard the isothermal transformation, particularly at and above the "knee" of the curve. Increasing the grain size of the austenite also delays the transformation.

This retardation is reflected in the greater hardenability of steels of higher alloy content and coarser grain. In fact, it has been observed that, in general, those factors which influence the shape and position of the curve determine the response of a steel to a specified heat treatment.

As the diagrams for more steels are worked out, the correlation between the form of the curve of the steel and its hardenability will be more clearly established. It will then be possible, according to Mr. Davenport, to select substitute steels with comparable hardenability by comparison of S-curves.

Perhaps the greatest usefulness of isothermal transformation diagrams lies in the fact that an over-all picture of the transformation behavior of austenite, which they present, will assist the heat treater or metallurgist to interpret observed phenomena and plan new tricks in heat treating. Already some of these are proving their practicability in production shops under the names of martempering, austempering, and isothermal or cycle annealing.

Before introducing the speaker, Technical Chairman F. J. Robbins of Plomb Tool Co. spoke briefly about the conference of western manufacturers and railroad officials which he attended recently in Salt Lake City. The purpose of this conference, Mr. Robbins explained, was the formulation of an equitable plan for delivered steel prices to the Pacific Coast which will not penalize western manufacturers while subsidizing those in the eastern part of the country.

Carburizing of Steels for Railway Operations Poses Special Problems

Reported by E. M. Evans
MacDonald Bros. Aircraft Ltd.

Carburizing of carbon and alloy steels from the standpoint of railway operations was the subject discussed on March 8 before the Manitoba Chapter A.S.M. The speaker was J. W. Mills of Canadian National Railways, Transcona, Manitoba.

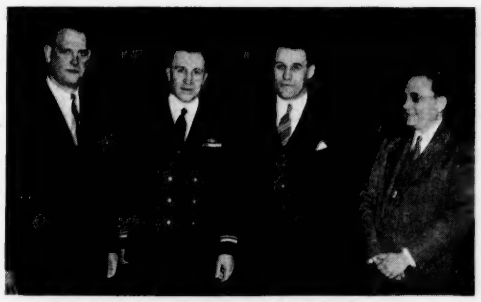
The procedure followed in the Transcona shops was described in some detail with special reference to microstructures of normal and abnormal case hardened steels, showing banded structures and structures found in steels not properly deoxidized. Improper deoxidation is the cause of soft spots, irregularity of martensite depth, and enfoliation. Retention of free cementite in the case, brought about by improper heat treatment which causes the case to crack or flake off, was also discussed.

The speaker emphasized the value of pot quenched parts such as pins and bushings which must resist considerable battering in service. These parts show an austenitic structure, and have proved their value in service. Stress was laid on the importance of preserving as much as possible of the original coverage or case of carburized parts that are pot-quenched, as all subsequent operations tend to injure the surface of the case.

Wire Association Regional Meeting in June

The Los Angeles Regional Meeting of the Wire Association will be held at the Los Angeles Biltmore Hotel on Friday, June 8, 1945. This will be a dinner meeting and the subjects discussed following the dinner will relate to problems incurred in supplying wire and wire products to the Signal Corps under wartime conditions.

Atom Smashing Featured for "Young Fellows"



Shown at the March meeting of the Pittsburgh Chapter are (left to right): J. Alfred Berger, chairman of the Young Fellows' Committee; Lt. W. D. Shaffner, who presented the coffee talk on the P-T Boat Navy; Alexander J. Allen, who described the electronics of atom smashing in his technical lecture; and Maxwell Gensamer, chapter chairman.

Reported by J. Alfred Berger
Molybdenum Corp. of America

"Young Fellows' Night," sponsored by the Pittsburgh Chapter of the American Society for Metals on March 8, featured the "Electronics of Atom Smashing and Some Applications in Metallurgy" by A. J. Allen, and the "P-T Boat Navy" by Lieut. W. D. Shaffner.

An innovation at this meeting was the presence as guests of the Society of 23 veteran patients from Deshon General Hospital in Butler, all holding "Purple Heart" citations. These men came voluntarily and it was both surprising and gratifying to note how interested they were in both the talks and their newly acquired friends.

Lieut. Shaffner of the U. S. Navy Metals Laboratory, recently returned from active duty, held the audience spellbound by his excellent coffee talk describing the P-T Boat Navy and its function in the South Pacific.

Dr. Allen, Westinghouse graduate professor of engineering at the University of Pittsburgh, who is constructing at the University a cyclotron for the Pittsburgh district, discussed some of the fundamental electronics of atom smashing and demonstrated the detection of various radioactive emanations by using a small portable Geiger counter. Dr. Allen briefly reviewed the structure of the atom; he described radioactivity and detected alpha particles from "radon seeds." His slides and formulas traced the derivation and equipment necessary to build a cyclotron to accelerate deuterons to 18 million electron volts and protons to 36 million electron volts of energy.

Tracer elements or "tagged atoms" are used for study of the diffusion of silver in copper and for corrosion studies of brass with radioactive arsenic. By placing some radioactive phosphorus on one soldier's dollar, Dr. Allen was able with the aid of the counter to identify the bill from several others. It was shown also that the thickness of materials can be measured by using the selective absorption of beta rays—several sheets of paper demonstrated this effect.

Mill operators and metallurgists today are perhaps not directly concerned with the electronics of atom smashing, but, as shown by Dr. Allen, the future holds direct electronic applications for the operating personnel as well as the research staffs of many companies.

Numerous Improvements Listed In Wartime Foundry Progress

Reported by P. D. Strubhar
Metallurgist, Andover Kent Corp.

"Wartime Developments of Iron and Steel Castings" was the subject presented by Gosta Vennerholm of the Ford Motor Co. at the April meeting of the Hartford Chapter. Mr. Vennerholm dealt with advancements in all types of castings, stating that the most attention in the grav iron foundry has been given to the development of higher strength irons.

Numerous improvements, the most outstanding of which are control of the moisture content of the air in the cupola, use of basic lined cupola, and in particular the increased utilization of inoculants, have helped to increase the physical properties of today's cast irons.

The greatest advance in the steel foundry has been accomplished through the increased utilization of alloys and the extensive application of liquid quenching in the heat treatment of the castings. As a result of this, castings have been adapted to many parts for which it was thought impossible to use them a short time before the war.

Among these are crankshafts, airplane brake drums, airplane landing gear parts, large caliber guns, cylinder barrels in airplane motors and armor piercing shot. Slides illustrating these various parts were shown, including a large alloy cast iron crankshaft weighing 12,000 lb. finish machined for use in submarine diesel engines.

Another important development is the application of the so-called "lost wax" method for making high speed tool parts, particularly intricately shaped tools such as reamers, broaches and form tools. These parts are cast to such close tolerances that it is only necessary to heat treat them and then grind the cutting edges, after which they are ready for use.

The utilization of special casting methods, such as centrifugal, vacuum casting, and pressure casting, has been widespread both in the gray iron foundry and the steel foundry.

Van Horn Cites Practical Applications Of Precipitation Hardening in Industry

Reported by H. L. Millar

Precipitation hardening and its practical applications to the metal industry formed the subject of the President's Night meeting of the Los Angeles Chapter at Scully's Cafe on March 22. Kent Van Horn, national president of the A. S. M., assistant manager of research for the Cleveland District, Aluminum Co. of America, and principal speaker of the evening, traced the development of precipitation hardening and recited that the metallurgist of today can harden a wide variety of alloys by use of the fundamental principles of precipitation in solid solution. He confined his lecture to the alloys of the light metals, principally aluminum and magnesium.

Dr. Van Horn was introduced by National Secretary Bill Eisenman, who, as coffee speaker, talked at length of the accomplishments of the Society and receipt of the Distinguished Ordnance Award.

Sleeper & Hartley Elects Officers

Sleeper & Hartley, Inc., Worcester, Mass., has announced the election of Clayton F. Fisher as president and general manager and Raymond F. Russell as vice-president and treasurer. William H. Blount, former president, has retired because of ill health.

A. V. de Forest, Originator Of Magnaflux Test, Dies

Albert V. de Forest, 56, professor in the mechanical engineering department of Massachusetts Institute of Technology, and president, Magnaflux Corp., Chicago, died April 5.

A. V. de Forest

Professor de Forest was best known for his development of the Magnaflux test for discovering defects in metals. Many engineering honors were conferred upon him, including the Modern Pioneers Award in 1940, the Longstreth Medal of the Franklin Institute, the Sylvanus Albert Reed Prize of the Institute of Aeronautical Sciences, and the Dudley Medal of the American Society for Testing Materials. He was a long-time member of the American Society for Metals.

He was born in New York and was graduated from Massachusetts Institute of Technology in 1912. He began his career in the drafting department of the New London Ship & Engine Co., and a year later became an instructor in engineering at Princeton University. He was associate research engineer, Union Metallic Cartridge Co. from 1916 to 1918 and for ten years thereafter was research engineer for the American Chain Co. He founded the Magnaflux Corp.

Salt Baths Now an Accepted Method Of Heat Treatment, Babcock Shows

Reported by Donald Sener
Harrisburg Steel Corp.

A modern, up-to-date talk on "Electrode Type Salt Baths in Modern Heat Treating Practice" was delivered by H. J. Babcock of the Ajax Electric Co. for the further enlightenment of the York Chapter at its Lancaster meeting on March 14.

Salt baths are now one of the accepted methods of heat treatment and no longer a step-child, Mr. Babcock said. The speaker divided his address into two parts, the first having to do with salt baths as a primary heating furnace and the second half with its use in an isothemal heat treating operations.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month. Prepared by Thelma Reinberg, Librarian.

2. SMELTING AND REFINING

2-42. **West Coast Steel Mill.** G. Eldridge Stedman. *Steel*, v. 116, April 2, '45, pp. 120, 123, 126.
Features efficient open-hearth practice at Columbia Steel plants.

2-43. **Sponge Iron—a Progress Report.** *Steel*, v. 116, April 9, '45, pp. 106-108, 148, 151-152, 154, 156.
Improved utilization of domestic iron, manganese and chrome ores. 8 ref.

2-44. **Preparation of Ultra-Pure Cartridge Brass.** J. L. Rodda. *Metal Progress*, v. 47, March '45, pp. 505-507.
Describes the preparation of brass made from spectrographically pure zinc and copper of comparable purity under conditions which did not introduce any impurities, but may actually have accomplished some purification, particularly in regard to gas content and oxide films.

2-45. **Slag Control.** N. H. Bacon. *Iron and Steel*, v. 18, March '45, pp. 86-90.
Making high grade steel is a matter of skill and experience but is facilitated by scientific control. Methods for adjusting the silica, phosphorus and sulphur in the bath.

2-46. **Steel Ingots.** B. M. Larsen. *Iron and Steel*, v. 18, March '45, pp. 91-96, 100.
Crystallization in a steel ingot depends upon a number of factors such as the shape of the mold, the temperature difference between the metal, the mold and the surroundings, and the composition of the steel. Effect of some of these factors on the final structure. (American Institute of Mining and Metallurgical Engineers.)

2-47. **Steel Ingots, III.** E. Barber. *British Steelmaker*, v. 11, March '45, pp. 122-126.
Difficulties with rimming steels; surface finish; causes of surface flaws; mold design; ingot structures; form of corrugations; mold taper; maintaining contact.

2-48. **New Type Ladle Nozzle.** *Steel*, v. 116, April 16, '45, p. 130.
Affords uniform pouring speed.

2-49. **Controlling Gases in Open Hearth Steel.** A. Floyd Whalen and James Nagy. *Blast Furnace & Steel Plant*, v. 33, April '45, pp. 446-448, 476.
Gases considered are those which are trapped upon solidification of the metal. These gases are formed while the molten metal remains in the furnace, and they can be controlled by temperature regulation, ladle additions, holding heat in ladle and pouring practice.

2-50. **Ladle Deoxidation in Steel Production.** *Blast Furnace & Steel Plant*, v. 33, April '45, pp. 469-474.
Impurities in a heat of steel removed by oxidation. Furnace, ladle, and mold additions of various deoxidizing agents perform this function, but react with the FeO in the metal and produce non-metallic inclusions in the heat. Control of the FeO content of the bath prior to deoxidation, through slag control, is fundamental, since by keeping the FeO content low the quantity of deoxidizing agents required is reduced. Discussion of the use of Simanal as a deoxidizer in various steels.

2-51. **Magnesium Production—I.** D. D. Howat. *Chemical Age*, v. 52, March 17, '45, pp. 237-243.
Developments in thermal reduction processes.

3. PROPERTIES OF METALS AND ALLOYS

3-56. **Properties of Thorium-Bearing Heat-Treatable Steels.** *Iron Age*, v. 155, March 29, '45, p. 55.
Effect of additions of thorium to three steels alloyed with vanadium, chromium and molybdenum.

3-57. **Nitrogen in Chrome-Nickel Steels.** *Iron Age*, v. 155, March 29, '45, pp. 56-60.
Improvements in mechanical and electrical properties resulting from a partial substitution of nitrogen for nickel in austenitic and austenitic-ferritic chromium-nickel steels. Translation by C. M. Cosman of an article in *Stahl und Eisen*.

3-58. **Boron in Malleable Iron.** Norman F. Tisdale. *Foundry*, v. 73, April '45, pp. 107, 222.
Extensive study of the subject has shown that boron, when properly used, results in a reduction in the annealing time, and also lessens the need of re-annealing.

3-59. **Development and Properties of Sand Cast Aluminum Alloy Having High Strength After Aging Without Previous Heat Treatment.** Hiram Brown. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1037-1051.
Development and properties of a sand cast aluminum-base alloy containing magnesium, zinc, and small amounts of titanium and chromium called B-81. 9 ref.

3-60. **The Effect of Copper on the Properties of Cast Carbon-Molybdenum Steels.** N. A. Ziegler and W. L. Meinhart. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1151-1174.
Results of studies of the effects of copper on the physical properties of carbon-molybdenum cast steels. Data obtained from the studies are shown in graphic and tabular form. 79 ref.

3-61. **Hardenability and the Steel Casting.** K. L. Clark and J. H. Richards. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1325-1346.
Cast and forged steels of identical compositions, in the low and medium alloy range, have comparable hardenability when variations in grain size are considered. Increasing the normalizing temperature of the cast steels from 1700° F. (925° C.) to 2000° F. (1090° C.) prior to quenching from 1650° F. (900° C.) has little effect on the hardenability except as it alters the austenitic grain size. In steels with appreciable amounts of chromium or molybdenum, the carbide forming elements covered in this study, a quenching temperature of 1650° F. (900° C.) is not high enough to insure complete solution of all of the carbides and the measured hardenability is lower than that calculated from composition and grain size. 14 ref.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous
2-42-43-45-46-47-48-49-50; **3**-71; **6**-44; **10**-23; **12**-72; **13**-9; **26**-77-78-79.

Cast Iron
3-58-65-67; **14**-102-106-112-116; **18**-85-87; **19**-104; **20**-116; **22**-172.

Cast Steel
3-60-61; **14**-109-115-122-125-131.

Wrought Carbon Steel
3-69; 4-15-16; **6**-35-38; **12**-67; **19**-115; **22**-191-210; **23**-88.

Alloy Steel
3-56-60-61; 4-13; **6**-36; **12**-68; **15**-11; **22**-191-207.

Stainless and Heat Resisting Steel
3-57-68; **6**-34-36-40; **7**-63; **18**-90; **22**-187.

Tool Steels and Carbides
14-128; **18**-82; **20**-135; **22**-179-209; 23-89.

General Non-Ferrous
27-62.

Aluminum
3-59-63-64; 4-12; **6**-34-37; **7**-59; 8-50; **9**-41; **14**-100-104-105-107-120-121-126; **19**-114-118-119; **20**-114-138; **22**-168-196-204; **23**-86-92-100.

Magnesium
2-51; **3**-66; 4-14; **7**-60; **9**-41; **14**-99-107-108-124; **18**-83; **19**-119; **22**-171-189; **23**-92-100; **26**-81.

Copper, Brass and Bronze
2-44; **5**-12; 8-43; **14**-113-123; **20**-134; **21**-27; **22**-203; **23**-87.

Nickel, Monel and Nickel Alloys
8-41; **19**-121.

Lead and Lead Alloys
21-27.

Tin and Tin Alloys
8-44.

Zinc and Zinc Alloys
6-31; 8-47; **19**-117; **20**-139; **22**-200.

Miscellaneous and Minor Metals
3-62; 4-11.

3-62. **Platinum and Its Production.** *Metallurgia*, v. 31, Feb. '45, pp. 173-175.
Deals with some historical aspects, production of the metal, and some of its properties and uses.

3-63. **100 Years of Aluminum.** Freeman Horn. *Metallurgia*, v. 31, Feb. '45, pp. 176, 177-179.
Laboratory, commercial and industrial periods, and the part played by Britain in the progress of this metal and its alloys.

3-64. **Aluminum Alloy Sheet and Strip.** E. G. West. *Metallurgia*, v. 31, Feb. '45, pp. 193-196.
Surveys these products and directs special attention to the remarkable progress so far achieved.

3-65. **Modern High-Duty Cast Iron.** E. W. Harding. *Machinery* (London), v. 66, March 8, '45, pp. 255-258.
Brief account of the mechanical properties of modern high-duty iron indicates the extent of the advance made in recent years in cast iron development. Emphasis given to the significance of the properties from an engineering point of view. Mention made of the special properties of the material which are already recognized; i.e., easy machinability, density, and solidity in varying casting sections, exceptional wear resistance, good response to heat treatment for hardness and strength, and fluidity which permits easy casting into intricate shapes.

3-66. **Magnesium and Its Alloys.** M. Loretan. *Schweizer Archiv*, v. 9, no. 7, July '43, pp. 219-228; Discussion *Schweizer Archiv*, v. 9, no. 8, August '43, pp. 258-259. British Non-Ferrous Metals Research Association *Bulletin*, v. 25, Feb. '45, p. 36.
Outlines production of magnesium by thermal and electrolytic methods giving flow sheets; reference to manufacture in Switzerland; properties of magnesium; effect of alloying elements and characterization of the more representative types of alloys (tables of compositions and properties).

3-67. **Process Control in Modern High-Duty Cast Iron.** E. W. Harding. *Machinery* (London), v. 66, March 15, '45, pp. 285-288.
Shows how the reliability of this metal has been ensured by manufacturing methods which provide a uniform product.

3-68. **Heat Resisting Alloys.** *Automobile Engineer*, v. 35, March '45, p. 98.
For heavy tensile loads at high temperatures.

3-69. **Mechanical Properties and Weldability of High Strength Plate.** George F. Comstock. *Metal Progress*, v. 47, March '45, pp. 511-520.
Investigation of high strength plate steel extended to include commercial plates of similar analyses, made under the conditions of actual steel mill practice to determine whether the preliminary conclusions would apply to tonnage production. The excellent properties and weldability of manganese-titanium steel is confirmed by tests on commercial plates from several sources.

3-70. **Metallurgy of Foreign Materiel.** J. H. Frye. *Automotive Industries*, v. 92, April 1, '45, pp. 33, 90, 92, 94, 98.
Foreign Materiel Branch established at Aberdeen Proving Ground to receive, catalog, proof test and arrange captured enemy material for engineering study and analysis. Some findings reported.

3-71. **The Past and Future of Steel.** C. H. Desch. *British Steelmaker*, v. 11, March '45, pp. 102-109.
Chemical analysis; microscopy; Thomas process; corrosion; alloy scrap recovery; low alloy steel; raw materials; post-war demand; scientific control required; training personnel; classes in working hours.

4. STRUCTURE

Metallography and Constitution

4-11. **Ar" in Chromium Steels.** Eugene P. Klier and Alexander R. Troiano. *Metals Technology*, v. 12, Feb. '45, Tech. Pub. 1799, 11 pp.
Effect of chromium on Ar" determined for 17 steels covering a wide range of compositions. Microstructure of martensite. Several of the steels were extremely sensitive to stabilization. Stabilization can occur without previous decomposition of austenite to martensite or any of the other decomposition products. 23 ref.

4-12. **Recrystallization of Aluminum in Terms of the Rate of Nucleation and the Rate of Growth.** W. A. Anderson and R. F. Mehl. *Metals Technology*, v. 12, Feb. '45, Tech. Pub. 1805, 28 pp.
Measurements made of the recrystallization of cold-worked high purity aluminum in sheet 0.015 in. thick. In terms of isothermal recrystallization rate curves, and in terms of the rate of nucleation, N rate of crystallization increases with decrease in initial grain size. Studies at high degrees of deformation, 90% by cold-rolling, suggest that N initially increases with time. Evidence is good that recrystallization nuclei form at points of high stress. 24 ref.

4-13. **The Structure of the Nitride Case on an Austenitic Steel.** W. Betteridge. *Journal of Scientific Instruments*, v. 22, Feb. '45, pp. 28-29.
The nitrogen case hardening of an austenitic steel was not successful by the normal methods, the hardened surface being spoiled by flaking of the outer layers of the case. Crystallographic examination showed that this was due to the presence of Fe_4N, which, in addition to flaking away, was softer than the underlying layers of γ solid solution. Modification of the nitriding method enabled the formation of Fe_4N, with the consequent flaking, to be avoided.

4-14. **The Crystal Grain Orientation in a Rolled Magnesium Alloy.** A. Hargreaves. Institute of Metals *Journal*, v. 71, Feb. '45, pp. 73-86.
Preferred orientation of the crystal grains in Elektron AM503 alloy sheet has been examined by X-ray methods. In the surface of the sheet the basal plane normals (0001) of the crystal grains are normal to the plane of the sheet, but in the center of the sheet they tend to align themselves along one of two most probable directions inclined at approximately 15° on either side of the normal to the sheet and lying in the plane containing the rolling direction and the sheet normal. There is a gradual transition from one type of basal plane orientation to the other on passing from the surface to the center of the sheet. The hexagon edges (1120) of the crystal grains are oriented parallel to the rolling direction in the surface of the sheet, but are oriented at random about the (0001) axes in the central regions of the sheet. 13 ref.

4-15. **Solution of the Diffusion Equation Applicable to the Edgewise Growth of Pearlite.** W. H. Brandt. *Journal of Applied Physics*, v. 16, March '45, pp. 139-146.
Diffusion equation is transformed to a set of coordinates moving with the pearlite interface and a solution applicable to the problem obtained in the form of an infinite series of terms. Using the first three terms, the edgewise velocity of pearlite growth is calculated for a plain carbon eutectoid steel using data most of which are obtained by extrapolation. The values obtained show reasonable agreement with values for the rate of pearlite nodule growth determined by Hull, Colton, and Mehl. The velocity increases with decreasing temperature, as expected, and it is shown that this is caused by the change in the solubilities of ferrite and cementite in austenite with temperature. The theory predicts curved ferrite-austenite and cementite-austenite interfaces and the carbon concentration in austenite is shown to vary across each of these interfaces.

4-16. **Estimating Temperatures Causing Damage to Plain Low-Carbon Steel Tubes.** Richard C. Corey. *Combustion*, v. 16, March '45, pp. 40-43.
Reviews the principal causes of tube failures and discusses how the probable temperature to which they have been subjected can be estimated by means of metallographic examination of microstructure changes. The basis of such studies is explained and limitations pointed out.

5. POWDER METALLURGY

5-12. Preparation of Copper Powder by Electrodeposition. A. H. Hothersall and G. E. Gardam. *Journal of Electrodepositors' Technical Society,* Preprint, v. 20, 1945, pp. 61-68.

Conclusions of a laboratory investigation carried out in 1934 for the British Non-Ferrous Metals Research Association. Object was to determine the most suitable and simplest conditions for the production of copper powder on a pilot plant scale. An outline design for a pilot plant to prepare 1 lb. of powder per hr. is included. No account has been taken of the patent situation.

5-13. Powdered Metal Points the Way to Machine-Building Economies. A. J. Langhammer. *Machinery,* v. 51, April '45, pp. 152-161.

Art of compressing and sintering metal powders into bearings and machine parts has been developed to such an extent that products weighing as much as 100 lb. can be economically made by this process.

5-14. Clutch Facings and Brake Linings of Powdered Metal Type. Joseph Geschelin. *Automotive Industries,* v. 92, April 1, '45, pp. 24-26, 85-86.

Among the unique advantages of all-metal friction linings, according to the manufacturer, are the following: Satisfactory performance at temperatures and unit pressures greatly exceeding those of conventional materials; longer life under severe operating conditions; the effect of oil and water on clutch and brake action minimized; it withstands severe shock loads; little affected by extremes of temperature or by variations in atmospheric humidity; can usually be used to replace conventional linings without changes in existing designs.

5-15. Powder Metal Parts. G. W. Birdsall. *Steel,* v. 116, April 16, '45, pp. 106-109, 150, 153-154, 156, 158.

Become more useful due to increased physical properties made possible through development of better methods of powder manufacture and control, and greater knowledge of processing accumulated in supplying wartime demands. Size and strength limitations prove unfounded.

6. CORROSION

6-31. Zinc Chromate Primers vs. Corrosion. W. R. Barrett. *Organic Finishing,* v. 6, March '45, pp. 17-19.

Theory of corrosion; theory of zinc chromate primer corrosion inhibition; design of zinc chromate primers; uses for zinc chromate primers.

6-32. Rust Preventives. *Steel,* v. 116, April 2, '45, pp. 106-108, 149-150, 152, 154, 156.

What has been learned under stress of war about proper packaging to preserve metal parts against ravages of corrosion will be of benefit in peacetime product distribution and in storage or shipment of idle machines during the postwar adjustment period.

6-33. Correcting Problems Caused by Scale and Corrosion in Compressor Stations. Paul V. Sanders. *Petroleum Engineer,* v. 16, March '45, pp. 208, 212.

Bacteria, gases, dust and algae no longer need be allowed to destroy maximum efficiency in compressor stations.

6-34. Mutual Influence of Electrodes and Its Importance for Corrosion. G. V. Akimov. *Metallurgia,* v. 31, Feb. '45, pp. 219-220.

The weaker the cathodic polarization, the more electrodes function as anodes. Cathodic polarization can be reduced, e.g., by (1) introducing oxidizing agents into the solution, (2) increasing the area of the main cathode, or (3) raising the external resistance between the main anode and the main cathode. In some heat treated aluminum-copper alloys the grain boundaries consisting mainly of aluminum which has dissolved only about 0.3% of copper. Heating of chromium steels and some chromium-nickel steels) leads to formation of inclusions of chromium carbide plus iron carbide.

6-35. Emulsions of Oil in Water as Corrosion Inhibitors. P. Hamer, L. Powell and E. W. Colbeck. Iron and Steel Institute, Advance Copy, Feb. '45, 18 pp.

Object of preventing corrosion in recirculating cooling-water systems, which was begun as a result of plant failures. Origin and object of the work discussed, together with the factors influencing the choice of experimental method. The oil emulsions referred to are those produced by adding "soluble oils" to water. These resemble the cutting oils employed on machine tools. Attention directed to the prevention of attack on mild steel. Three types of water have been used under both static and flow conditions at room temperature, and at 60 and 90° C. 7 ref.

6-36. Corrosion of Steels in Marine Atmospheres and in Sea Water. C. P. Larrabee. Electrochemical Society, Preprint 87-12; April 16, '45, 18 pp.

Data presented which show that the corrosion of steels in various atmospheres depends upon the amount and type of pollution and the composition of steel or alloy. Each composition must be tested in different locations for exact comparisons to be made. In sea water, plain and low alloy steels are shown to have an average corrosion rate of about 22 mg. per sq. dm. per day (0.004 in. per yr. average penetration). Pitting attack characterizes the corrosion of stainless steels although the presence of 2 to 3% molybdenum in the 18-8 type or very high alloy content diminishes this tendency.

6-37. Stress-Corrosion Tests on Al-Zn-Mg Casting Alloy G54. W. Bergmann. *Korrosion und Metallschutz,* v. 20, no. 1, Jan. '44, p. 67. British Non-Ferrous Metals Research Association *Bulletin,* v. 25, Feb. '45, p. 43.

Authors investigated: (1) The corrosion behavior of aluminum casting alloy G54 in form of fork specimens (*Gabelproben*) in tap water (pH 8.3 to 8.9), synthetic sea water, and 3% NaCl solution, under conditions of agitation, alternate immersion or spray; (2) effect of heat treatment (60 to 70° C.) on stress-corrosion under conditions given in (1); (3) effect of certain alloying additions (0.1 to 3% Si; 0.01 to 3% Th; 0.01 to 3% Cu; 0.01 to 1% V; and 0.1 to 1% Mn, Fe, Ti respectively) and additional heat treatment.

6-38. Failure of Spring Loops by Stress Corrosion. Given Brewer. *Metal Progress,* v. 47, April '45, pp. 707-712.

Experiments revealed corrosion cracking in the wire spring clips. High carbon, cold drawn wire is far more resistant to stress corrosion cracking than is heat treated wire of the same strength and chemical content. It is inadvisable to acid pickle heat treated high carbon steel after forming operations, or in any condition where high residual stresses are known to be present. The range of temperature ordinarily assumed to accomplish stress relief was ineffective.

6-39. Evaluating Rust Preventatives. Bryant W. Pocock. *Products Finishing,* v. 9, April '45, pp. 32-34, 36, 38.

Procedure for evaluating rust preventatives, which purports to eliminate the uncertainties of older methods and to substitute a scientifically acceptable and reproducible technique.

6-40. Clad Steels for Corrosive Service. H. S. Blumberg. *Corrosion and Material Protection,* v. 2, April '45, pp. 11-16.

Discussion, limited entirely to "ferrous" group of bimetals, deals with the following topics: Need for clad steels; general properties of individual metals; backing materials; facing materials; description of the common methods for producing clad steels and their fabrication.

6-41. Planning and Interpreting Corrosion Tests. F. L. LaQue and B. B. Knapp. *Corrosion and Material Protection,* v. 2, April '45, pp. 17-23.

Corrosion tests made as a guide to the choice of a material for a particular purpose in connection with some process. Answer to the lack of correlation between conventional laboratory corrosion tests and results under actual service conditions is found in factors discussed. These are: Heating or cooling of metal surface; velocity; changes in corrosive character of solution; effect of critical concentration; vacuum and pressure; galvanic effects; concentration cell effects; effects of stress; effect of surface condition; effect of specimen size; heat treatment; improper duration of test; incomplete examination of corrosion test specimens.

6-42. A Guide to the Selection of Corrosion - Resistant Piping Materials. L. G. Vande Bogart. *Corrosion and Material Protection,* v. 2, April '45, pp. 25, 40-41.

Charts to provide an indication of the results that might be obtained from certain metal combinations.

6-43. Corrosion Primer. *Corrosion and Material Protection,* v. 2, April '45, pp. 31-33.

Definition, classification, and occurrence of corrosion discussed.

6-44. Corrosion of Iron by Sulphides. Richard Pomeroy. *Water Works & Sewerage,* v. 92, April '45, pp. 133-138.

Presentation of a few typical cases of corrosion caused by sulphides; descriptions of the selected examples, based on observations, followed by a brief discussion of the principles and comments pertaining to suggested remedial measures. 9 ref.

6-45. Engineering Aspects of Water Corrosion. *Corrosion and Material Protection,* v. 2, April '45, pp. 26-30.

Extended abstract of ten papers presented at the Fourth Annual Water Conference of the Engineers Society of Western Pennsylvania. Inhibitors; deaerating heaters; bacteria; steam condensate; water supplies; accelerator softeners; spiractor; boiler scale; zeolite; demineralizing.

7. CLEANING AND FINISHING

7-57. Fixtures Improve Output of Polishing and Buffing Machines. A. H. Losey. *American Machinist,* v. 89, March 29, '45, pp. 115-118.

Machine tables accommodate six to eight fixtures. Examples of holding set-ups for production of various parts.

7-58. Electrostatic Spraying and Detearing Process. Sanford Narkey. *Modern Industrial Press,* v. 7, March '45, pp. 24, 26, 42.

Painting complex parts automatically, economically and with a superior finish.

7-59. Conveyorized Equipment for Finishing Aircraft Parts. R. R. Janssen and D. D. Williams. *Iron Age,* v. 155, April 5, '45, pp. 54-57.

Increased processing capacity for cleaning and finishing aluminum, magnesium and steel parts amounting to over 800,000 per week has been attained by a continuous overhead monorail conveyor with appreciable saving in space, manhours and material.

7-60. New Magnesium Anodizing Process. James C. Fuller. *Aluminum and Magnesium,* v. 1, March '45, pp. 20-21, 28-29, 43.

An anodizing method for coating magnesium alloys which produces a surface film that inhibits corrosion, resists abrasion and forms a tight, integral bond with paints. Explains the operation of the process and points out how revolutionary discovery was made.

7-61. Symposium on Surface Finish. *Machinery* (London), v. 66, March 15, '45, pp. 290-292.

The structure of sliding surfaces; surface finish in relation to friction and lubrication. 11 ref. (Institution of Mechanical Engineers).

7-62. Chemistry of Surface Cleaning. Ray Sanders. *Iron Age,* v. 155, April 12, '45, pp. 62-67.

Cleaning is a complex phenomenon involving in various combinations such actions as wetting, emulsification, saponification, colloidal activity, solvent power, pH, buffer action, total alkalinity and acidity and water conditioning. Much of the enormous amounts of time and labor expended in the removal of the common forms of dirt and paint can be cut by a knowledge of the basic factors involved in each surface cleaning job.

7-63. Electrolytic Polishing of Stainless Steel and Other Metals. Otto Zmeskal. *Metal Progress,* v. 47, April '45, pp. 729-736.

Various solutions reported to be satisfactory for the polishing of stainless steel, and discusses some of the variables involved in obtaining a bright surface from anodic action. The literature contains information on useful electrolytes for other metals, and this information is collected in a supplementary table. 114 ref.

7-64. Rapid Finishing of Small Size Parts. S. S. Pierce. *Die Casting,* v. 3, April '45, pp. 61-63.

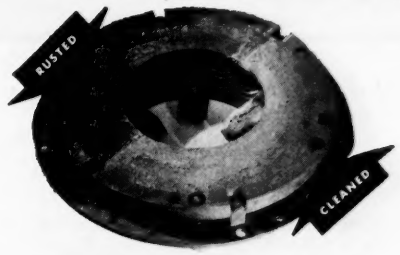
Discussion of the factors involved in a balanced paint system and the application to high speed, low cost production finishing of small parts.

7-65. Cleaning Aluminum Munition Components. Vic Gruendler. *Die Casting,* v. 3, April '45, pp. 68-70.

Loading tests demonstrated one absolute "must" in the finishing of die cast aluminum munition components—cleanliness. How this important requirement was met.

(Continued on Page 7)

FAST, EFFECTIVE RUST REMOVAL BY *Surface Chemistry*



Turco W.O. #1, through Surface Chemistry, minimizes pre-cleaning and makes neutralizing treatment unnecessary. One continuous operation reconditions metals, passivates surface, prepares it for durable rustproofing or painting.

Contains no abrasives, requires neither scouring nor sanding. A short dip in Turco W.O. #1, or a brief wiping makes rust disappear. The wetting properties of Turco W.O. #1 enable it to penetrate screw threads, grooves and crevices which could not be reached any other way.

W.O. #1 wets out and removes minor soil deposits. It is not hindered by presence of light oil film. Unless work is heavily soiled, precleaning is unnecessary.

W.O. #1 deposits an absorbent phosphate film on the surface of the work which bonds tenaciously with primer, paint and rust-proofing compounds.

A W.O. #1 treated surface is therefore not only clean and free of rust, but ready immediately for final processing. One trial will prove it.

Write for full particulars about Turco W.O. #1, another Turco development in *Surface Chemistry*.

TURCO
INDUSTRIAL CHEMICAL COMPOUNDS

TURCO PRODUCTS, INC. • Main Offices and Factory: 6135 S. Central Ave., Los Angeles 1 • Offices and Factories: 1538 Hendee or St. Winston 1-7, Tex. 122 W. 46th St., Chicago 9 • Offices and Warehouses: All Principal Cities

Mention R902 When Writing or Using Reader Service.

Specialized CORROSION PREVENTIVES ... QUAKER FERROCOTES

. . . modern chemical compounds made possible by Quaker-developed advanced testing techniques:

• To DEVELOP specific compounds of known ability to prevent corrosion under specific conditions of use . . . that is and has been Quaker's aim. In this work Quaker research chemists enjoy two tremendous advantages:

1. Not being restricted to the use of petroleum derivatives or by-products, they are free to draw from *all* sources of organic chemicals.

2. Having discarded most conventional methods of evaluating corrosion preventives as *too inaccurate,* Quaker research chemists have developed new and improved types of humidity cabinets and testing techniques.* These make possible accelerated laboratory tests that tie in with the many and varied conditions met in actual use.

The result has been the development of more than a score of FERROCOTES—*specialized* corrosion preventives each having a proved ability to protect precision parts under a specific set of environmental conditions.

A Quaker Process Engineer will gladly specify the particular FERROCOTES especially suited to protect your products . . . during processing . . . while in storage in your plant . . . during inter-plant shipment . . . and for final packaging.

**Details of these will be sent on request to interested readers.*

QUAKER
CHEMICAL PRODUCTS CORP.
CONSHOHOCKEN, PA.
Other Plants in CHICAGO and DETROIT
Warehouse Stocks in Principal Industrial Centers

Mention R903 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Published by the
American Society for Metals
7301 Euclid Ave., Cleveland (3), O.

KENT R. VAN HORN, *President*
C. H. HERTY, JR., *Vice-President*
WILLIAM H. EISENMAN, *Secretary*
HARRY D. McKINNEY, *Treasurer*

Trustees
R. W. SCHLUMPF A. L. BOEGEHOLD
L. S. BERGEN A. E. FOCKE
MARCUS A. GROSSMANN, *Past President*

Subscriptions one dollar a year. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Ray T. Bayless.....*Editor*
M. R. Hyslop.....*Managing Editor*

Cleveland, Ohio—May, 1945
Volume XVIII Number 5

Five Advantages of Gray Cast Iron Given; Heat Resistant Irons Discussed

Reported by H. H. Hewitt, Jr.
Steel Tank and Pipe Co.

Five advantages of gray cast iron were enumerated by Albert G. Zima of the International Nickel Co.'s Los Angeles office, addressing the Oregon Chapter of the A.S.M. on Feb. 13 on "Heat and Corrosion Resistant Cast Irons." These are that it is easy to produce, is cheap, its graphite content makes it self-lubricating, and readily machinable, it has good damping qualities, and good heat and corrosion resistance at moderately high temperatures.

Mr. Zima explained the effects of alloying elements in detail, stating that all heat resistant cast irons should contain chromium. Nickel is added to minimize the effect of thermal shock, to maintain strength at elevated temperatures, and to improve machining characteristics. It also forms a tenacious scale which resists corrosion at elevated temperature. Molybdenum is added to disperse the cementite in finer particles, and to impart higher strength.

Heat treatment of cast iron is coming into its own, according to the speaker, cast irons of 100,000 psi. tensile now being produced.

Convention Papers Invited

A CORDIAL INVITATION is extended to all members of the American Society for Metals to submit technical papers to the Publication Committee to be considered for the annual convention of the Society usually held in October. Arrangement of the technical program and educational lectures for the convention are proceeding as usual, on the possibility that conventions and expositions will again be permissible by that time.

Three copies of the paper accompanied by three sets of drawings and illustrations must be sent to the National Office in Cleveland to the attention of Ray T. Bayless, assistant secretary, American Society for Metals. Headquarters should be notified immediately of your intention to submit a paper.

Helpful suggestions for the preparation of technical papers will be sent to all who indicate their intention to submit papers for the program.

Lindberg Research Director Also Appointed Manager of Sales

Norbert K. Koebel has been appointed manager of sales for Lindberg Engineering Co., Chicago. Since 1940 he has been director of research at Lindberg, in which capacity he will continue to serve. He is a graduate of Ohio State University with degrees of Master of Science in Metallurgical Engineering and Professional Chemical Engineering. Mr. Koebel is the author of a book and numerous articles on controlled atmosphere heat treating.

Robert W. Dougherty of Lindberg in Chicago has been transferred to the Detroit sales office where he is now associated with Frank J. Condit.

Induction Heating by Spark Gap, Vacuum Tube And Motor Generator Equipment Covered

Reported by Ralph W. Stahl
Lindberg Engineering Co.

The presentation of the vitally important subject of induction heating at the February meeting of the Indianapolis Chapter was unique in that it was divided equally among three well-known authorities, namely: H. B. Osborn of the Ohio Crankshaft Co., manufacturers of motor generator and vacuum tube oscillator equipment; J. J. Fox of Lepel High Frequency Laboratories, Inc., makers of spark gap induction heating units; and J. W. Cable representing the Induction Heating Corp., manufacturers of vacuum tube oscillator equipment.

Dr. Osborn covered the history and fundamentals of the science of induction heating. He pointed out that the shallower the depth of heating desired and the smaller the diameter of the piece to be heated, the higher the cycles required, and conversely, the greater the depth of heating and the heavier the piece, the lower the cycles needed. Dr. Osborn divided the frequency ranges of the various types of commercially available equipment approximately as follows:

1. Motor generator equipment—up to 11,000 cycles with no limit on the maximum kw. output.
2. Spark gap equipment—100,000 to 400,000 cycles with a maximum power of 25 kw. output.
3. Vacuum tube oscillator equipment—200,000 and up, with a limit of 50 kw. output.

From this it was emphasized that on applications involving heating of heavy sections, motor generator type equipment is the best suited. Installations were cited where through heating for hardening and reheating for tempering on sections up to 2½ in. in diameter are being done on a continuous basis without formation of scale.

Mr. Fox, representing the spark gap equipment industry in the range of 100,000 to 450,000 cycles, pointed out that the outstanding advantage of this type of equipment lies in its easy adaptability to a wide variety of applications. Work coils ranging in size from ⅛ in. to 48 in. in diameter can be connected to the unit without the use of any auxiliary equipment, and the machine can then be simply tuned to assure maximum efficiency for the particular coil in use.

The other principal advantages claimed for the spark gap equipment are simplicity, ruggedness, no moving parts, portability, long life, no fragile parts, and lower initial and operating costs.

J. W. Cable, covering the field from the standpoint of a vacuum tube oscillator equipment manufacturer, in the range of 100,000 up to 1,000,000 cycles, traced the history of communication equipment through the spark gap development stage to the introduction of the vacuum tube.

Some induction heating jobs, Mr. Cable said, require very high frequencies and some very low frequencies, but the vast majority can be handled by any frequencies in the middle range. Adjustment of the frequencies is generally not necessary and, in fact, elimination of frequency adjustment eliminates variables and makes the equipment easier to handle.

Mr. Cable emphasized that vacuum oscillators are static equipment, requiring no maintenance except tube replacement, which may be required every 7,000 hr.

Stotz Returns to Braeburn As Vice-President, Sales

Norman I. Stotz is now vice-president in charge of sales of the Braeburn Alloy Steel Corp., Braeburn, Pa., where he has returned after ten years' absence as chief metallurgist with the Universal - Cyclops Steel Corp. Mr. Stotz's former position with Braeburn, from 1920 to 1926, was first as chief metallurgist and later as general superintendent. His college education was divided between Colorado School of Mines and Lehigh University.

N. I. Stotz

Long active in A. S. M. affairs, he is a past chairman of the Pittsburgh Chapter, served for many years on the A.S.M. Metals Handbook Committee and its predecessor, the Recommended Practice Committee, and was a member of the Publication Committee in 1937-38.

Age Hardening Is Van Horn's Subject At Puget Sound Officers' Night

Reported by Harry P. Evans
Metallurgist, Boeing Aircraft Co.

The national president and national secretary of the A. S. M. were honored by over 100 members and guests of the Puget Sound Chapter on March 14.

Secretary Eisenman presented a progress report on the activities out on his farm, interspersed with many of his famous stories, and gave a resumé of the activities of the Society, of which the membership can be justly proud.

"Age Hardening of Metals" was the subject of Dr. Van Horn's technical address. He developed the fundamentals which underly the age hardening of all metals and discussed in some detail the age hardening of aluminum, copper, lead and iron as typical of these alloys. With the aid of some very pleasing and eye-filling curves interspersed among his otherwise technical slides, Dr. Van Horn delivered an extremely interesting discourse and ably upheld his reputation as a fluent speaker.

$1000 Prize Contest Announced for Technical Papers on Resistance Welding

In order to encourage the preparation of outstanding papers dealing with resistance welding subjects, the Resistance Welder Manufacturers Association, Philadelphia, has for several years conducted a prize contest. The scope of this contest has recently been increased, bringing the total amount of the awards up to $1000.

One prize of $500 will be awarded for the best paper emanating from an industrial source in which the major portion of the subject matter is concerned with design for resistance welding. Two prizes of $200 each will be awarded to the authors of two papers, not primarily concerned with design, but which, in the judgment of the Board of Awards, are the greatest original contributions to the advancement and use of resistance welding. One of these papers must emanate from a university source, and the second from an industrial source. A fourth prize of $100 will be awarded to the author of the best remaining paper, which may fall in any of the three groups mentioned above. The contest will close July 31, 1945.

Talented Personnel Conducts Machining of Metals Course

Reported by John E. Mitchell
Chief Metallurgist, Marmon-Herrington Co., Inc.
(Chairman, Educational Committee, Indianapolis Chapter)

Some outstanding talent was utilized by the Indianapolis Chapter of the A.S.M. in its 1945 educational course on "Machining of Metals," conducted in six lectures during February and March. The textbook used was "Machining of Metals" published by the A.S.M.

The first class lecture was given by M. Martellotti, research engineer of the Cincinnati Milling Machine Co. He covered the "Physics of Metal Cutting" and showed a recent movie on the use of negative rake on high speed milling operations.

The second lecture was presented by Arthur E. Focke, research metallurgist of the Diamond Chain and Mfg. Co., on the "Machinability of Wrought Steels."

At the third meeting, Norman D. Jones, engineer for the Aluminum Co. of America, gave an interesting talk and showed an excellent sound movie on the machining of aluminum. Various phases of the machining of other non-ferrous metals were also discussed.

"The Machining of Cast Metals" was discussed by Paul F. Ulmer, assistant chief metallurgist of the Link Belt Co., while J. T. Leyden, metallurgical engineer of the Crucible Steel Co. of America, covered the "Machinability of Tool Steels."

"Machining of Stainless Steels" was covered in the final lecture by W. H. Kemper, metallurgical engineer of Carpenter Steel Co.

One of the highlights of the course was a series of questions presented to the class members. These were framed so as to require some outside study and were designed to stimulate interest. A technical book prize was offered for the highest grades and was taken by W. J. Toussiant, process metallurgist of Bridgeport Brass Ordnance Co.

Metal Literature Review—*Continued*

7. CLEANING & FINISHING *(Cont.)*

7-66. Surface Finish. *Automobile Engineer,* v. 35, March '45, p. 119.

Surface to be measured; proposed wave length classification of surfaces; magnification and distortion of the graph.

7-67. Eliminating the Old Steel Hot Plate Dryer, II. Wallace G. Imhoff. *Products Finishing,* v. 9, April '45, pp. 40-42, 44, 46, 48, 50, 52, 54.

Liquid flux technique and how its use provides for the elimination of the old steel hot plate dryer in hot dip galvanizing.

7-68. The Scope and Limitations of Radiant Heating in Drying Processes. H. Silman. *Foundry Trade Journal,* v. 75, March 8, '45, pp. 195-198.

Methods which will find an important place in mass-production schemes. Tungsten filament bulbs; stoving of paints and enamels; influence of color; sources of radiation. 3 ref.

7-69. Conditioning and Coating Small Parts for Aircraft. James Crum. *Industrial Finishing,* v. 21, April '45, pp. 28-32.

Mass production setup designed to clean, dry and paint, efficiently and economically, the many small parts that go into the construction of Douglas aircraft.

7-70. Surface Treatment for Metals. F. A. Morral. *Wire and Wire Products,* v. 20, April '45, pp. 272-273, 276-277.

Cleaning and oxide removal; metal, diffusion, chemical, and organic coatings. Flame and induction hardening.

8. ELECTROPLATING

8-41. High Speed Nickel Plating. W. L. Pinner and R. B. Kinnaman. *Monthly Review,* v. 32, March '45, pp. 227-234.

Development of a high speed dull, and a high speed bright nickel plating process permitting the commercial use of high current densities in decorative nickel plating. 4 ref.

8-42. The Fundamentals of Chemistry for Electroplaters. XVII: Properties of Solutions. Samuel Glasstone. *Monthly Review,* v. 32, March '45, pp. 253-255.

Boiling points and freezing points of solutions; molecular weights of electrolytes; theory of ionic dissociation; anions and cations.

8-43. Stripping of Copper From Various Base Metals. F. C. Mathers and C. E. Landwerlen. *Monthly Review,* v. 32, March '45, pp. 268-270.

Progress report number one; A.E.S. research project number 1. Bibliography of 56 items.

8-44. Protective Value of Electro-Tin as an Undercoating. S. Wernick. *Journal of the Electrodepositors' Technical Society,* Preprint, v. 20, 1944, pp. 47-60.

There is a marked improvement in corrosion resistance of a given deposit, whether this be zinc or cadmium and also, but not markedly, nickel, if the first thin layer of electrodeposit is substituted by a corresponding thickness of electrodeposited tin. Electrodeposited tin, as such, cannot adequately replace either of the electro-negative protective finishes which are commonly applied for rust preventing purposes, i.e., zinc or cadmium plating. If therefore, the tin undercoating does not improve the sacrificial function of the zinc deposit, the cause of its effectiveness must be sought for elsewhere. Electro-tin coating has a close-grained structure and thus results in the deposition of a layer of metal which is relatively freer from pores than a similar layer of either zinc or cadmium. The tin undercoating enables the deposit which is subsequently applied to be more uniformly distributed.

8-45. Plating with Insoluble Anodes. Walter R. Binai. *Metal Finishing,* v. 43, April '45, pp. 144-146, 170.

Insoluble anodes in acid copper solution; insoluble anodes in cyanide solution; silver replenishment-shot tower; electrolytic replenishment; trouble involved.

8-46. Nomograph on Thicknesses of Electrodeposits. Arthur S. Covert. *Metal Finishing,* v. 43, April '45, p. 147.

Designed to answer the questions most frequently met by the plater who wishes to deposit a given thickness of metal. Given the metal to be plated and the current density, it indicates the time required to deposit a given thickness or conversely the thickness achieved in a known time.

8-47. The Cronak Process as Appied to Zinc Plate. S. E. Maxon. *Metal Finishing,* v. 43, April '45, pp. 148-149.

Why and where it is used; general operations; use on zinc alloy die castings and rolled zinc; maintenance of solution; variables of the process; reasons for poor results; handling. 3 ref.

8-48. Electrodeposition of Iron-Tungsten Alloys From an Acid Plating Bath. M. L. Holt and Rodney E. Black. *Metal Finishing,* v. 43, April '45, pp. 150-153, 176.

Study of the electrodeposition of iron-tungsten alloys from a plating bath prepared by the addition of small amounts of sodium tungstate to the ferrous ammonium sulphate bath to investigate the possibilities of electrodepositing tungsten alloys from commercial plating baths, modified by the addition of sodium tungstate. Main purpose is to obtain information which may lead to a better understanding of the process by which tungstates are reduced at the cathode during electrolysis, although the possible importance of electrodeposited tungsten alloys is not being overlooked.

8-49. The Choice of Plated Coatings. H. L. Farber. *Metal Finishing,* v. 43, April '45, pp. 154-155.

Some ten or twelve metals and alloys are in extensive commercial use as electroplated finishes. In addition many combinations and variations of these metals are being used to obtain coatings to meet special requirements. A number of factors are involved in determining the kind of metal to be deposited and the finishing system to be used, including the use to which the product is to be put, the base material to be finished, the cost of finish to be used and the facilities required.

8-50. Electro-Plating on Aluminum. *Aluminum and the Non-Ferrous Review,* v. 9, Oct.-Dec. '44, pp. 52, 54-55.

From an electrodeposition point of view, aluminum presents many intricate problems, but at the same time an enormous and ever-widening field of application. Methods which may be employed in the plating of aluminum and problems to be faced.

9. PHYSICAL AND MECHANICAL TESTING

9-37. The Overstrain of Tubes by Internal Pressure. W. R. D. Manning. *Engineering,* v. 159, Feb. 9, '45, pp. 101-102.

Describes an approximate method of non-elastic straining applied to cylindrical sections where the degree of deformation is large and touches briefly on the mechanism of rupture in cylinders in the light of this theory.

9-38. The Yielding Phenomenon of Metals, II. Georges Welter. *Metallurgia,* v. 31, Feb. '45, pp. 207-212.

Influence of speed and loading conditions.

9-39. Creep Phenomena in Steels at Room Temperature. A. Pomp and A. Krisch. *Mitteilungen aus der Kaiser Wilhelm Institut für Eisenforschung,* v. 16, 1943, pp. 59-69. *Nickel Bulletin* (London), v. 18, Feb. '45, pp. 23-24.

Condensed review of creep investigations made at room temperature, on non-ferrous materials and tests on various steels. Structure of the respective steels illustrated by a series of photomicrographs.

9-40. True Stress-True Strain Diagrams—I. *Metal Industry,* v. 66, March 16, '45, pp. 165, 168.

Application to the measurement of work-hardening characteristics. 3 ref.

9-41. Fatigue Failure in Shear Panels of Aluminum and Magnesium Alloys. E. R. Schenkel. *Product Engineering,* v. 16, April '45, pp. 222-225.

Comparison of the shear fatigue life of aluminum and magnesium alloy panels fabricated with various types of rivets used by the aircraft industry. Results are presented in chart form to allow the designer to evaluate quickly the fatigue characteristics of these rivet and alloy combinations in certain applications.

9-42. Relation Between Hardness and Other Mechanical Properties. T. H. Gray. *Product Engineering,* v. 16, April '45, pp. 236-240.

Non-destructive hardness testing, employed in evaluating other mechanical properties, is discussed and formulas and graphs are given which will assist in the fuller utilization of this test. Practical examples illustrate its use in design and shop practice.

9-43. Determination of Crankshaft Stresses in Critical Regions With Damping. J. Geiger. *Automotive Industries,* v. 92, April 1. '45, pp. 28-32.

In determining the incremental stresses in the critical regions, the point of application of the damping force is vitally important, as well as the point of application of the exciting force. With high effective damping, when the amplification is less than three times the static deflection, a corresponding correction must be made in the incremental stresses determined from torsiograms taken at the free end of the shaft. (Translated from *Automobiltechnische Zeitschrift.*)

9-44. Definitions of Tensile Properties, II. *Industry and Welding,* v. 18, April '45, pp. 40-41.

Proportional limit; elastic limit; proof stress.

9-45. The Overstrain of Tubes by Internal Pressure. W. R. D. Manning. *Engineering,* v. 159, March 9, '45, pp. 183-184.

Theory appears to throw some light on the actual way in which a cylinder of ductile material fails. While the pressure is too low to cause overstrain at any point in the tube wall, the tangential stress is highest at the inner surface, as also is the radial stress. As the pressure is raised, the elastic limit is first reached on the bore surface and the overstrain spreads outwards from the bore across the wall. As it does so, it causes the tangential stress to fall in the inner layers and to increase rapidly in the outer.

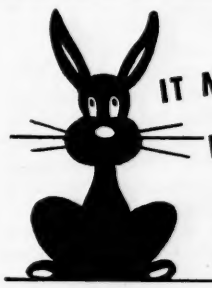
GET THE MOST OUT OF
YOUR SPRAY WASHER WITH
METAL CLEANING
TERJ
COMPOUND
The improved metal cleaner that increases washer efficiency by keeping it free from foam and lime deposits. Terj has five points of proved superiority.
NON-FOAMING
Minimizes foam formation in spray cleaning operations.
SAFE ON METALS
Will not pit, corrode or discolor the surface of metal being cleaned.
PREVENTS SCALE
Prevents lime scale in hardest water. No clogged nozzles . . . no reduction in pressure due to fouled lines.
NO RESIDUES
No residues. Leaves no deposit to interfere with finishing operations.
ECONOMICAL
Low recommended using concentration —takes less to do a better job.
For further information, write to . . .
THE DUBOIS CO. -- CINCINNATI 3, OHIO
Warehouses in All Principal Cities — Service Men Everywhere

Mention R904 When Writing or Using Reader Service.

Ryerson Alloy Report with every shipment — an important aid for heat treatment — write for data

Joseph T. Ryerson & Son, Inc. Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

Mention R905 When Writing or Using Reader Service.



IT MAY SEEM LITTLE BUT, IT'S OH SO BIG!

When it comes to speeded up and uninterrupted production, we can all take our hats off to the rabbit . . . this little fellow does a little job in a big way and doesn't let changing conditions interrupt production.

METEX COMPOUNDS are so developed that you can speed up your production and have an uninterrupted cleaning cycle. During the past few years special variations of METEX Compounds have been formulated for every finishing, cleaning, pickling, and stripping need. Ask our distributor located in your territory to prove the superiority of METEX Compounds by actual demonstration on your product—with your equipment.

Write for Free Data Sheets and Folders

MAC DERMID
INCORPORATED
WATERBURY 88, CONNECTICUT

WRITE ONE OF THESE SERVICE ORGANIZATIONS FOR FREE DEMONSTRATION

NEW YORK	CHICAGO	DETROIT	CLEVELAND	ST. LOUIS	TORONTO—CAN
Udylite Corp (L I Cty)	Udylite Corp Geo A Stutz Mfg Co	Udylite Corp Wagner Bros	Udylite Corp McGean Chem Co	Sahlein, Incorporated	Clark Industrial Supplies Co

Mention R906 When Writing or Using Reader Service.

Now for EVERY WORK SHOP!
NEW Invention Electroplates by BRUSH

Easy to Plate CHROMIUM
GOLD, SILVER, NICKEL, COPPER
. . . For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets tools, fixtures, silverware, etc., with a durable sparkling coat of metal . . . Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE!

For
- MODEL MAKERS
- MAINTENANCE
- HOBBY SHOPS
- HOME SHOPS
- SALVAGE PARTS

WARNER ELECTRIC CO., DEPT. B-113
663 N. Wells St., Chicago 10, Illinois

FREE Details & Sample!

WARNER ELECTRIC CO., 663 N. Wells St., Chicago 10, Dept. B-113
Gentlemen: Send Free Sample and Details to:
Name _____
Address _____
City _____ State _____

Mention R907 When Writing or Using Reader Service.

Relations Shown Between Corrosion And Heat Treatment

Reported by Melvin H. Knapp
Metallurgist, Brown & Sharpe Mfg. Co.

In violation of standard Chamber of Commerce procedure, the speaker for the March 7th meeting of the Rhode Island Chapter ignored the temperate climate and bathing facilities of North Carolina's Kure Beach and stressed rather the alloy compositions and thermal treatments which could be so ideally tested in those selected saline surroundings. The speaker was Frank L. LaQue of International Nickel's Development and Research Division, who illustrated by slides and discussion "Some Relations Between Corrosion and Heat Treatment."

With relation first of all to the internal structure of metals, it was pointed out that annealing methods may significantly influence resistance to corrosive attack. In the case of the austenitic 18-8 stainless steel, there is a particular tendency for carbon to be precipitated from solution as the metal cools through the range of 1400 to 800° F. Since the carbides formed may require as much as 16 times as much chromium as they have carbon, considerable chromium is taken from the restricted volume of austenitic alloy in the immediate vicinity, thus depriving that area of the constituent required to make it passive to attack. Since carbides tend to precipitate preferentially at grain boundaries, these boundaries may be shown to be particularly susceptible to acid etching.

The harmful temperature ranges are to be encountered in such operations as cooling of castings or forgings, welding, or stress annealing and may, moreover, be unavoidable due to the wording of certain fabrication codes. A common corrective measure best recognized in welding is to add columbium or titanium to satisfy the carbon in place of chromium.

In considering the relation of internal stresses to corrosion, the speaker explained that the strained metal would not store up enough energy to increase substantially the solution potential when exposed to an acid solution. Hence the value might well be overshadowed by other causes of potential difference, resulting in the frequent observation that the stressed material actually appears more noble than the unstressed metal.

Certain metals do, of course, suffer severe damage when exposed in the stressed state to appropriate media. This caustic embrittlement further appears to require a specific corrosive agent which will be comparatively ineffective against some other metal, while an agent which embrittles the second material will have no similar effect on the first.

Finally, in reviewing the effect of heat treatment on the surface of metals, Mr. LaQue showed examples of steel where pitting was considerably accelerated by the presence of mill scale, whereas "K" monel with an oxide surface had increased resistance over the clean metal. In the case of alclad, heat treatment was shown to vary the protective property of the cladding by diffusing the core metal through the surface material.

Talks by Three Younger Members Feature Dayton Home Talent Night

Reported by T. E. Hamilton
Metallurgist, Delco Products Division, G.M.C.

The Dayton Chapter meeting on April 11 was "Home Talent" night with three of the younger members of the Chapter providing the program. They were Sgt. Jay R. Burns, metallurgist, Materials Laboratory, A.T.S.C., who discussed "Micro-Porosity in Two Magnesium Casting Alloys"; William T. Bryan, metallurgical engineer, Duriron Co., discussing "Monel Metal Castings"; and Howard Chalfant, metallurgist, Inland Manufacturing Division of General Motors Corp., who spoke on "The Machinability of Resulphurized Steels."

All of the speakers presented fine talks and the meeting was a repetition of last year's success with this type of program.

Light Alloy Castings Ottawa Subject

Reported by E. N. Marshall
Chief Inspector, Ottawa Car and Aircraft, Ltd.

"Aluminum and Magnesium Alloy Castings" was the subject of the monthly meeting of the Ottawa Valley Chapter on March 6. The speaker, A. E. Cartwright, metallurgist of the Robert Mitchell Co., Montreal, brought out many interesting points regarding the use of this type of casting in present-day aircraft practice and discussed its postwar possibilities.

Golden Gate Lecturer Congratulated

Chapter Chairman Victor Beauchamp (left) congratulates Claude L. Clark of the Timken Roller Bearing Co. on the success of his lecture series. Officers and executive committee in the background are (left to right): Harold Krayenbull, secretary; John Dorn, vice-chairman; Ed Hudson, Philip McCaffery, Hugh Davies, F. H. Ditzler, Don D'Amico, Robert Freeman, and Cutler Shepard.

High Temperature Properties Subject of Five-Lecture Series

Reported by O. Cutler Shepard
Associate Professor of Metallurgy, Stanford University

An average attendance of more than 150 at the Golden Gate Chapter's spring lecture series gave evidence of wide interest in the subject, namely, "High Temperature Properties of Steels". All five lectures were presented by Claude L. Clark, of the Timken Roller Bearing Co., on the evenings of April 4, 5, 6, 9 and 10 at the University of California.

Dr. Clark stated that high temperature use of metals involves plastic flow called creep. The equi-cohesive temperature, at which grain boundary strength becomes less than crystal strength, is important in determining the type of creep as well as whether the metal fails by ductile or "blunt type" fracture. He believes that the equi-cohesive temperature and the lowest temperature of recrystallization are the same.

Methods of evaluating high temperature steels were presented, including creep tests, stress-rupture tests, surface stability and structural stability tests. Dr. Clark stated that there is no general agreement as to the most suitable high strength characteristic to be used in the design of equipment for service at elevated temperatures. Some still resort to short-time tensile strength at the temperature in question, applying a factor of safety based on previous operating experience. Others base their selection of stresses on either the creep or rupture strength, with the specific creep rate and rupture time varying considerably.

In discussing the influence of alloy additions on high temperature properties, Dr. Clark said that, in general, the solid solution alloying elements are most effective in improving the surface stability while carbide formers are most effective in increasing strength, but individual elements of course vary.

The compostion and properties of present-day high temperature steels were discussed, and causes of service failures explained.

In rounding out the subject, Dr. Clark pointed out the hot processing difficulties encountered with high temperature alloys. The "hot twist" test was described as an ideal procedure for determining the best temperature for hot working an individual alloy in any particular process.

The Golden Gate Chapter is grateful to the Steel and Tube Division of the Timken Roller Bearing Co. for making Dr. Clark's lectures possible.

Higher Yields, Lesser "Art" Required Are Advantages of Centrifugal Castings

Reported by Joseph Mazia
Engineer (Chemical), Frankford Arsenal

An enthusiastic audience greeted A. E. Schuh's presentation of a paper on "Centrifugal Castings" before the Philadelphia Chapter on March 23.

After briefly tracing the history of the subject from the original patent of Ekhart in England, 1809, to the present, the lecturer, who is associated with the U. S. Pipe and Foundry Co., gave an interesting illustrated account of modern true centrifugal as well as centrifuged castings.

The main advantages claimed for "spun" castings over static castings were the higher yields and somewhat lesser "art" required. However, Dr. Schuh stressed that poor castings could be made by either method if rigorous control were not maintained and sound engineering principles not observed.

Dr. Schuh displayed many interesting sample castings such as trench mortar barrels, mortar shell and recoil cylinders.

Thompson Products Executive Predicts Future of Aircraft

Speaking on "What's Ahead in the Aircraft Industry?" before the Cleveland Chapter on March 5, A. T. Colwell, vice-president of Thompson Products, Inc., pointed out the rapid growth of the aircraft industry during the present war crisis and the improvements in engines and plane design. He also pointed out some of the shortcomings of our present-day planes, engines, and propellers, and stressed the need for new and better materials for engine improvement.

A clear picture of the economics of air transportation was presented to the audience along with the possible future improvements in size and efficiency of the operation of planes for both commercial and private use. The use of private planes will be somewhat limited by their cost and the access to numerous conveniently located air strips.

The postwar era of the aircraft industry will be composed of three elements: Military, commercial, and private. Of these, the military field will be the largest, and will be followed by the commercial field which will be about one tenth of the military business, and the future of the private plane business will be in the third place and is dependent upon many factors, both inside and out, of the aircraft industry.

This meeting, which was "Sustaining Members' Night", attracted the largest turnout of the season.

Aluminum Alloys Is President's Subject For Oregon Chapter Meeting

Reported by H. H. Hewitt, Jr.
Steel Tank and Pipe Co.

National President's Night was held by the Oregon Chapter on March 15. National Secretary Bill Eisenman first told about his farm and traveling experiences with Dr. Van Horn. Then getting down to more serious things, he described the work of the A. S.M. and the place it holds in the rank of technical associations.

National President Kent Van Horn gave a very fine talk on "Application of the Aluminum Casting and Wrought Alloys". He explained in detail the effect of the different alloying elements on pure aluminum, the use of alclad, anodized aluminum, and the process of dyeing the anodized film.

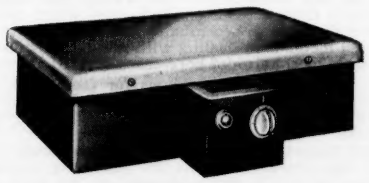
Film on Die Castings Issued

A motion picture entitled "Die Casting" which is available for showing before various industrial and educational groups has been prepared by the New Jersey Zinc Co. This film is 16-mm. Kodachrome with sound and requires 30 min. to show.

A detailed description of the operation of die casting equipment is given, together with illustration of a typical die casting die and the function of its various parts. The development and evaluation of die casting alloys and numerous applications of die castings are included.

Interested groups should address their requests to C. R. Maxon, Market Development Division, The New Jersey Zinc Co., 160 Front St., New York 7, N. Y.

THESE *"flat-tops"* ARE MAKING LABORATORY HISTORY



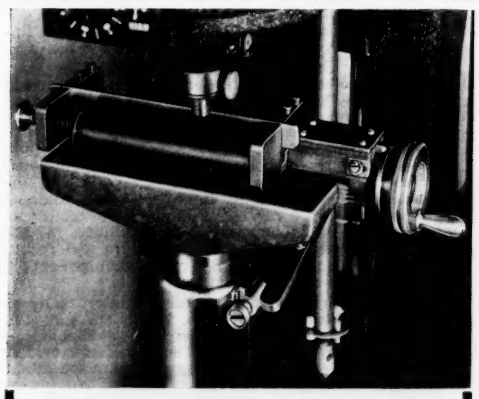
The new Lindberg Laboratory Hot Plates are engineered and built to do precise, controlled laboratory work. The built-in input control enables the operator to raise or lower the plate temperature to any degree of heat up to 950° F. Convenient, accurate and economical for all laboratory jobs such as boiling, evaporations, heating, etc.

The coiled nickel-chromium wire elements heat the entire surface of the top plate. In three standard sizes: 10"x12", 12"x20" and 12"x30".

Your laboratory equipment dealer will give you complete information about the Hot Plate as well as Lindberg Laboratory Furnaces. Call him today and learn how the modern Lindberg laboratory equipment will benefit you.

LINDBERG ENGINEERING COMPANY
2450 W. Hubbard St. Chicago 12, Illinois

Mention R908 When Writing or Using Reader Service.



PRECISION INDEXING FIXTURE FOR JOMINY HARDENABILITY BARS

Developed in co-operation with J. T. Fergusson, Notre Dame University

This new fixture mounts readily on either the Clark or Wilson Hardness Testing Machine. It consists mainly of a heavy rigid base casting, indexing screw and a quick return mechanism. The plug which supports the fixture in the hardness tester is hardened and ground tool steel, projects upwards through the base casting, and forms the surface against which the diamond point presses against the Jominy bar. The screw operating the carriage back and forth is stainless steel and turned by means of a brass chrome-plated hand wheel. A bronze half-nut is fastened to a quick release lever engaging the screw. When the test bar has reached the end of its travel, the half-nut is released and the entire carriage slides back rapidly to the new starting position. An adjustable stop automatically provides the initial starting point on the test bar. A spring plunger holds the test bar into position and allows enough freedom for the bar to rest firmly on the hardened steel stud. Finished in black Kem-Resist, with plated parts finished in chrome.

SPECIFICATIONS:

Dimensions of indexing Fixture: Overall size—10" x 4" x 3½". Net weight: 5 lbs. Gross weight: 11 lbs. CAT. No. 7765.

Write for Bulletin No. 850-G.

See Your Laboratory Supply Dealer

PRECISION SCIENTIFIC COMPANY
1736-54 N. Springfield Ave., Chicago 47, U.S.A.
ENGINEERS AND BUILDERS OF SCIENTIFIC APPARATUS AND PRODUCTION CONTROL LABORATORY EQUIPMENT FOR ALMOST A QUARTER CENTURY

Mention R909 When Writing or Using Reader Service.

Metal Literature Review

10. ANALYSIS

10-23. Colorimetric Methods as Applied to the Analysis of Electroplating Baths, IV. D. Gardner Foulke and L. I. Horner. *Monthly Review*, v. 32, March '45, pp. 249-251.
Determination of iron. 4 ref.

10-24. The Application of Spectrochemical Analysis in the Steel Mill. P. R. Irish. Optical Society of America *Journal*, v. 35, March '45, pp. 226-233.
Operation at the alloy division of the Bethlehem, Pa. plant. (Paper presented at 29th Annual Meeting of Optical Society of America, Oct. '44.)

10-25. The Chemist and the Microscope, I. Cecil L. Wilson. *Metallurgia*, v. 31, Feb. '45, pp. 213-216.
The methods and requirements of chemical microscopy are briefly discussed and some indication is given of the many ways in which it can be used.

10-26. Chemical Analysis by X-Ray Absorption. H. A. Liebhafsky and E. H. Winslow. *General Electric Review*, v. 48, April '45, pp. 36-39.
Routine measurements quickly made on gases, liquids, and solids. Often useful in checking chemical composition of materials.

11. LABORATORY APPARATUS, INSTRUMENTS

11-17. Wire Wound Resistance Strain Gages. *Wire Industry*, v. 12, March '45, p. 143.
Modern technique enables the aeronautical engineer to measure stresses in propeller blades arising from centrifugal and aerodynamic loads. Principle of strain gaging.

11-18. Spline Gages Hold Close Tolerances. B. P. Astley and A. S. McClenaghan. *American Machinist*, v. 89, March 29, '45, pp. 106-107.
Unable to procure involute spline gages immediately, a Westinghouse plant used equipment on hand to make its own gages.

11-19. Comments on Dilatometer Operation. H. W. Dietert. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1011-1019.
Specimen position in furnace; quartz tube for expansion test; thermocouple location; accuracy of hot strength readings; correlation of A.F.A. 2x2-in. with 1⅛x2-in. specimen readings; furnace preheat temperature; another operation method.

11-20. The Acoustic Strain Gage. R. S. Jerrett. *Journal of Scientific Instruments*, v. 22, Feb. '45, pp. 29-34.
Acoustic strain gage and its application to the measurement of surface strains produced both by static and dynamic loading. The apparatus consists of a test gage, a reference gage and a control set. The note from a vibrating wire in the test gage is matched against the note from a similar wire vibrating in the reference gage. The method of measurement is very sensitive and under normal conditions strains of the order of $1x10^{-6}$ can be recorded. The test gage may be used in remote positions and controlled from a distance. 4 ref.

11-21. A 100-Kv Electron Microscope. L. Marton. *Journal of Applied Physics*, v. 16, March '45, pp. 131-138.
Transmission type electron microscope with magnetic lenses. Electron speed can be varied between 30 ekv. and 100 ekv. The magnification of the instrument is produced in three stages. The instrument has improved air locks, hydraulically operated stage movement, and a stage tilting device up to ± 15½°. It is also provided with means for bright and dark field illumination and for conversion into a diffraction camera. Improved electrical circuits provide the necessary stability of the power supplies.

11-22. Strain-Gage Amplifier. N. G. Branson. *General Electric Review*, v. 48, April '45, pp. 55-58.
How multichannel amplifier enables a magnetic oscillograph to be used with an electric gage to record dynamic and transient quantities.

11-23. "Centerscope" and Optical Gaging System. *Engineering*, v. 159, Feb. 23, '45, pp. 146-147.
New form of Centerscope illustrated showing it in use on a vertical milling machine mounted in a toolroom lathe. In both instances the operator views the work through an eyepiece, the work being illuminated during the operation by the small bulk and reflector shown.

11-24. Caliper-Type Size-Indicating Gage. *Engineering*, v. 159, Feb. 23, '45, p. 156.
Designed to indicate departures from the nominal size in fractions of an inch and thus should be useful in enabling the necessary tooling alterations to be made where a run of oversize or undersize parts shows this to be desirable, in addition to functioning in the normal way.

12. INSPECTION AND STANDARDIZATION

12-58. Some Observations on the Structure of Acid-Resistant Vitreous Enamels for Chemical Plant. G. E. Charlish and E. J. Heeley. *Foundry Trade Journal*, v. 75, Feb. 22, '45, pp. 147-152.
High-frequency spark test and the detection of voids in enamelled coatings.

12-59. Where Magnetic-Particle Testing Stands as an Inspection Tool. *American Machinist*, v. 89, March 29, '45, pp. 108-112.
Report on present stage of the art, compiled from data presented at symposium conducted in Philadelphia under auspices of A.S.T.M.

12-60. A New Gaging Method for Quality Control. P. M. Dickerson. *Tool & Die Journal*, v. 10, March '45, pp. 132, 134.
Patrol inspection plus control charts have reduced the rework from 10% to less than 1%.

(Continued on Page 10)

World's most widely used Dial Scales

• Accurate, rapid, reliable! Whatever your requirements are for weighing, counting, weight-recording, batching, force-measuring... *Look to Toledo!* Toledo Scale Co., Toledo 12, Ohio.

•

TOLEDO
HEADQUARTERS FOR SCALES

Mention R910 When Writing or Using Reader Service.

Buehler

HAND GRINDERS
for fine grinding of metallurgical specimens

The Buehler Hand Grinder No. 1410 is a most convenient piece of equipment to facilitate the hand grinding of metallurgical specimens. Two grinding surfaces are available for two grades of abrasive paper. When four stages of grinding are desired two No. 1410 grinder units are employed. A drum (7½" diameter) at the head of each grinding surface holds up to 150 feet of abrasive paper that can be quickly drawn into position and clamped firmly for use.

Either wet or dry grinding can be conveniently performed on this grinder. The surface beneath the paper is highly polished heavy black plate glass. Overall dimensions are 15" x 26" x 8"; shipping weight 70 lbs. Polishing surfaces 4" x 12".

No. 1415 grinder accommodates standard size abrasive paper sheets. It serves in a like manner as No. 1410 for the convenient hand grinding of specimens. Overall size 17"x 11"x3". Shipping weight 30 lbs.

THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES—CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES

Buehler Ltd.
A PARTNERSHIP
METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

Mention R911 When Writing or Using Reader Service.

A.S.M. Review of Current Metal Literature — *Continued*

12. INSPECTION AND STANDARDIZATION (*cont.*)

12-61. **Making Rock Drills at Gardner-Denver.** *Steel*, v. 16, April 2, '45, pp. 114, 116, 118, 174, 176.
Complete inspection at many production stages assures perfect interchangeability of drill parts. Tolerances of 0.000025 in. held on many parts.

12-62. **Inspection of Industrial Materials Stressed by X-Ray Laboratories.** *Western Metals*, v. 3, March '45, pp. 37-38.
X-ray laboratories capable of radiographing all types of light and heavy metal castings.

12-63. **Magnetic Particle Inspection.** *Canadian Metals & Metallurgical Industries*, v. 8, March '45, pp. 27-30.
Progress in equipment, specifications and applications.

12-64. **Radiographic Specifications and Standards for Naval Materials.** Clyde L. Frear. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1078-1110.
Use of this method of inspection has resulted in a distinct improvement in the soundness of castings which enter into the construction of hulls and machinery. Specifications have been issued to cover the Navy requirements as to radiographic technique. To aid in the interpretation of radiographs and decision as to the necessity for repair of defects, the Bureau of Ships has issued radiographic standards showing the acceptability of typical defects occurring in various classes of castings used in ship construction.

12-65. **X-Ray Micrography as a Tool for Foundry Control.** Leslie W. Ball. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1111-1125.
Use of X-ray micrography and shows that with the proper equipment and technique the procedure can be simplified. Microcavities can be studied in sufficient detail to enable their proper diagnosis and correction. An identification library of radiographs together with corresponding micrographs can be provided to assist X-ray interpreters in making decisions regarding castings.

12-66. **Determining Soundness of Welds in Line Construction.** William E. Crenshaw and D. E. Abbey. *Petroleum Engineer*, v. 16, March '45, pp. 233-234, 236, 238.
Non-destructive precision method of preventive inspection used at stations as well as in laying of lines.

12-67. **Prevention of Flakes in Steel Forging Billets.** Paul S. Kingsley. *Metal Progress*, v. 47, April '45, pp. 699-704.
Studies made of the part played by internal stresses resulting from the phase changes taking place in the steel during cooling, the weakening effects of segregation, inclusions and dendritic pattern, and the internal pressure exerted by precipitated gases.

12-68. **A Proposed Matched Set of Steels.** J. E. Erb. *Metal Progress*, v. 47, April '45, pp. 724-728.
Simplification would result not only in enormous economies for American industry but also in improved quality of product. Sets forth a concrete, definite proposition.

12-69. **Can You Use a Simple Check for Diameters of 3-Fluted Tools.** Charles L. Hall. *Production Engineering and Management*, v. 15, April '45, p. 94.
With a standard 60° V-block and one measurement. Formula given for quick computation.

12-70. **Progressive Inspection Stations Assure Accuracy of Piston Rings.** D. M. Smith. *American Machinist*, v. 89, April 12, '45, pp. 114-117.
Close dimensional tolerances of aircraft rings require additional checking stations to those used in inspecting commercial rings.

12-71. **Electrography.** H. D. Hughes. *Metal Industry*, v. 66, March 16, '45, pp. 169-172.
Describes apparatus and methods for examining the surface of electrodeposits. (From Electrodepositors' Technical Society.) 8 ref.

12-72. **Some Methods of Establishing and Enforcing Controls of Surface Quality.** H. J. Forsyth. *Blast Furnace & Steel Plant*, v. 33, April '45, pp. 455-460.
Considers means by which some controls of surface quality may be established and enforced in steel making operations to secure economies in salvaging costs and production rates. Experiences in a mill producing high quality killed steels described to illustrate factors which proved of value in development and control work.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-9. **Open Hearth Bath Pyrometer.** *Canadian Metals & Metallurgical Industries*, v. 8, March '45, p. 37.
Method of measuring the temperature of liquid steel in the open-hearth furnace.

14. FOUNDRY PRACTICE AND APPLIANCES

14-99. **Magnesium Alloy Castings.** G. L. White. *Canadian Metals & Metallurgical Industries*, v. 8, March '45, pp. 20-22, 46.
Efficient production by small Canadian foundry.

14-100. **Metallurgy in the Non-ferrous Foundry.** A. C. Boak. *Canadian Metals & Metallurgical Industries*, v. 8, March '45, pp. 23-26.
Casting the high shrinkage metals and alloys. 2 ref.

14-101. **Testing Castings.** *Canadian Metals & Metallurgical Industries*, v. 8, March '45, pp. 31-36.
Modern methods aid foundry in controlling quality.

14-102. **Planning the Foundry of Tomorrow.** John E. Linabury. *Foundry*, v. 73, April '45, pp. 98-99, 230, 232, 234-235.
Ideal layout for a production-type gray iron foundry. Many of the recommendations are applicable to other types of foundries.

14-103. **Centrifugal Casting Speeds.** J. E. Hurst. *Foundry*, v. 73, April '45, pp. 105-106, 210, 212, 214, 216.
Early developments in centrifugal castings and theoretical calculations of rotational speed. 12 ref.

14-104. **Improves Aluminum Alloy Melting Procedure.** Ira M. Wise. *Foundry*, v. 73, April '45, pp. 116-119, 238, 240.
Some of the technical problems encountered in making castings from "Y" alloys for an intricate oil pump body for one of the highly specialized aircraft engines.

14-105. **Rolls-Royce Cylinder Blocks.** *Machinery* (London), v. 66, Feb. 22, '45, pp. 193-198.
Casting practice at Buick's aluminum factory. Outstanding feature is the extensive employment of mechanized equipment for the movement of raw materials and work in process.

14-106. **The Development of Grey Iron Die Castings.** H. K. Barton. *Machinery* (London), v. 66, Feb. 22, '45, pp. 213-216.
Metal molds; pressed-steel die cavities; open-mold die casting; melting technique; the Holley process; operating the Holley machine; air-cooled dies; dressing the dies; increased production.

14-107. **Increasing Foundry Efficiency.** Daniel W. Moll. *Aluminum and Magnesium*, v. 1, Jan. '45, pp. 16-19.
Molding; core making; sand conditioning and handling; cleaning; who should maintain pattern? Should foundry provide stock cores; keeping manufacturing department advised; development procedure; heat treating.

14-108. **Engineering and Application of Magnesium Alloy Castings, II.** David Basch. *Aluminum and Magnesium*, v. 1, Jan. '45, pp. 22-23, 26-30.
Welding; impregnation; casting methods; tempers of castings; choice of alloys; sand castings; general data pertaining to magnesium alloy sand castings; magnesium alloy permanent mold castings; magnesium alloy die castings. 5 ref.

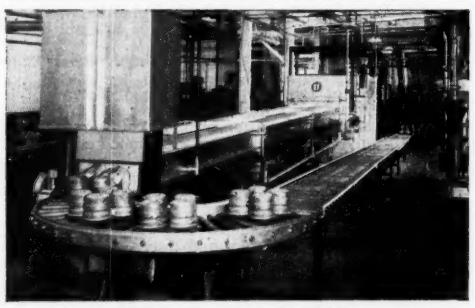
14-109. **Fourth Progress Report on Investigation of Physical Properties of Steel Foundry Sands at Elevated Temperatures.** D. C. Williams. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 979-1009.
An investigation of the size of the posts and the material from which they were made, of air drafts through the heating unit, improved positioning of test specimen within the furnace, refinements in testing technique. 35 ref.

14-110. **Mold Atmosphere Control.** H. W. Dietert, R. L. Doelmann and R. W. Bennett. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1053-1077.
By incorporating mold atmosphere control so that the gases in the mold are not oxidizing, much of the work now being done in the cleaning room possibly may be eliminated, with a saving in labor, equipment, and compressed air cost.

14-111. **A Study of Molding Methods for Sound Castings.** F. G. Sefing. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1126-1136.
Principles involved in making castings sound. 6 ref.

14-112. **Considerations in Casting and Coining Malleable Iron.** H. W. Streeter. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1146-1150.
Coining to produce malleable iron castings having a dimensional accuracy equal to that of machined surfaces. The data is insufficient to warrant drawing many conclusions.

14-113. **Some Causes of Test Bar Failures in Navy "G" and "M" Metals.** Wm. B. George. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1175-1188.
When a test bar fails, the foundryman is often unable to diagnose the trouble and prevent it from happening. If the first test bar fails and the second bar passes, the foundryman does not investigate further. There is a reason why one of these bars failed. This paper is prepared for those who are interested in these failures and represents actual cases.



The Assemblies are Discharged Securely Joined, Bright, Continuously . . . from EF Brazing Furnaces

Products requiring several stampings joined or requiring screw machine parts, forgings and stampings to complete the unit, can be neatly and economically joined right in your production line. Strong, leak-proof joints are made and the completed unit is discharged from the furnace — clean and bright.

Any number of joints in the same product or any number of pieces can be joined at one time.

Investigate This Process for Joining YOUR Aluminum, Brass, Copper or Steel Parts

Send for circulars, showing other types of EF brazing and soldering furnaces.

The Electric Furnace Co., Salem, Ohio

Mention R912 When Writing or Using Reader Service.

14-114. **Studies on Bore Cracks in Flanged Fittings.** Joseph A. Duma and Stanley W. Brinson. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1217-1250.
Effect of various molding, thermal, and design factors on the formation of the widely publicized bore cracks in flanged castings. Influences which tend both to suppress and to accentuate bore cracking are listed. Several methods of dealing with these cracks discussed. Probable mechanism of bore-crack formation described.

14-115. **Design of Test Coupons for Cast Steel.** R. C. Wayne, H. F. Bishop and H. F. Taylor. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1251-1265.
Test coupons of various designs were cast in steel, and their relative merits in producing satisfactory blanks for tensile tests compared on the basis of mechanical properties and economy of yield. Coupons of the cloverleaf type in which the tensile blanks are spaced around a central section not only give properties equal to or better than those of other more conventional types, but require much less riser metal per specimen. The blanks may be readily removed by a cold saw or torch. 3 ref.

14-116. **Gray Iron—Steel Plus Graphite.** J. T. MacKenzie. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1266-1270.
Formation of graphite. (Reprinted from the Twenty-first Annual Henry Marion Howe Memorial Lecture, published in *Metals Technology*, June '44.)

14-117. **The Use of Gypsum Cements in Pattern and Model Making.** E. H. Schleede. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1271-1285.
Characteristics of gypsum cement and how it may be used in making patterns and models. Necessary tools and equipment and five different work methods described. Figures used to show some of the charateristics of the material and techniques employed.

14-118.—**Drying and Preheating of Foundry Ladles.** C. E. Bales and F. McCarthy. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1286-1292.
Effect of boiling; behavior of damp linings; ladle lining materials; vent holes in ladles; methods for drying ladles; methods for preheating ladles.

14-119. **Thermosetting Plastic Core Binders for Ferrous and Non-Ferrous Metals.** William C. Morgan. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1317-1324.
Types of thermosetting plastic core binders and their related factors in ferrous and non-ferrous metals; the relation of these binders to casting quality and the characteristics of the binders in reaction with sand and ingredients in the core sand formula. Workability in the core room, including baking, collapsibility, gas and retained strength of the core. Procedure and results of experiment conducted to determine requirements of such binders in several foundries. 4 ref.

14-120. **The War-Time Aluminum Foundry.** George Mortimer. *Metallurgia*, v. 31, Feb. '45, pp. 187-192, 196.
As aluminum became commercially available and was applied to engineering, it soon became evident that it was too soft for many engineering purposes and aluminum alloys began to appear. Initially these were used for castings and although development was slow in applying these new alloys, the motor car and, more recently, the airplane have given a tremendous impetus to development.

14-121 **Progress in Aluminum Die-Casting.** Arthur Street. *Metallurgia*, v. 31, Feb. '45, pp. 197-200.
Aluminum alloy die castings combine the accuracy, uniformity, and superior surface finish of die castings in general with the lightness, strength, and high degree of resistance to corrosion of the aluminum alloys. Review indicates the high standard of modern production technique and provides useful guidance to industries seeking effective methods of production of non-ferrous components.

14-122. **First Report of the Foundry Practice Sub-Committee of The Steel Castings Research Committee.** Iron and Steel Institute, Advance Copy, Feb. '45, 53 pp.
Part 1 records work on the running and risering of simple shapes used as 4-in., 6-in. and 9-in. cube castings, and castings 6 in. square by 12 in., 18 in. and 24 in. long. Part 2 discusses the so-called "whirl-gate" head method of feeding steel castings and recent examples of the application of this type of head and of the "atmospheric" head. Foundry trials comparing the different types of feeding compound used on the fluid steel as it rises into the heads of steel castings are summarized in part 3. Part 4 gives experiments designed to provide a numerical index of the tendency of different steels to hot tears in the mold. In Part 5, some of the wartime activities of the sub-committee are set out, and some fundamental casting problems are mentioned in Part 6.

14-123. **Copper Castings.** J. B. McIntyre. *Metal Industry*, v. 66, March 23, '45, pp. 178-179.
Difficulties encountered when casting "pure" copper have been attributed to the presence of oxygen. Author analyses the causes of porosity and suggests a procedure to reduce troubles to a minimum. 2 ref.

14-124. **Gating, Risering and Chilling of Magnesium Castings.** A Cristello. *American Foundryman*, v. 7, April '45, pp. 7-10.
Standardized gating risering. Maintain control and troubles will be minimized. (Originally delivered as a technical paper at a W.P.B. meeting.)

14-125. **Influence of Centrifugal Casting Upon Steel.** L. Northcott and D. McLean. *Engineering*, v. 159, March 9, '45, pp. 197-200.
Determines the influence of variations in casting temperature, mold speed, mold temperature and rate of pouring upon the structure, segregation and properties of centrifugally cast thick cylinders with any one alloy composition. (Iron and Steel Institute.)

14-126. **Some High-Tensile Aluminum Casting Alloys.** J. Morgan. *Foundry Trade Journal*, v. 75, March 8, '45, pp. 189-194.
Addition of silicon to aluminum improves its properties for casting purposes, raises the strength without rendering the alloys brittle and decreases the density. Aluminum-silicon alloys are exceptionally fluid and give sharper impressions of intricate molds than almost any other aluminum alloy. When melted and cast in the normal manner, the alloys exhibit no outstanding properties, but, if subjected to the process of modification, the structure of the alloys undergoes a change and a beneficial effect on the properties is produced.

14-127. **A Mechanized Foundry.** *Automobile Engineer,* v. 35, March '45, pp. 87-94.

Mechanization of the Humber Ltd. Foundry whereby a 250% increase in production capacity has been obtained from the same superficial area, with an increase of less than 100% in the labor employed. Description is given of a special fixture used for assembling cylinder block cores ready for insertion in the mold. Reference is made to the methods employed for controlling material quantity and for testing the finished castings.

14-128. **Ford Produces High-Speed Steel Cutters by Precision Casting.** Charles O. Herb. *Machinery,* v. 51, April '45, pp. 144-151.

Unusual application of the waste wax or investment method of mold making which has enabled large economies to be effected and which points the way to many postwar applications.

14-129. **An Important Message Via Teletype.** R. R. Teichner. *Die Casting,* v. 3, April '45, pp. 22-25, 48, 50.

Parts formerly machined from bar stock or from rough sand castings and which are now die cast to tolerances ranging from 0.0005 to 0.005 in.

14-130. **Design Rules—XII.** Herbert Chase. *Die Casting,* v. 3, April '45, pp. 28, 30-32.

Do make use of letters, numerals and other markings wherever they add to the utility of the die casting without unjustified cost, but make sure that details do not incur needless expense in preparing the die or interfering with ejection of the casting.

14-131. **Steel Foundry Practice.** *Engineering,* v. 159, March 16, '45, p. 206.

Degree of hot tearing on a particular design can be minimized, or often eliminated, by using steel with a lower sulphur content. With normal designs, there should be little trouble if the sulphur content is below 0.035% but for more intricate designs it may be necessary to go to still lower limits.

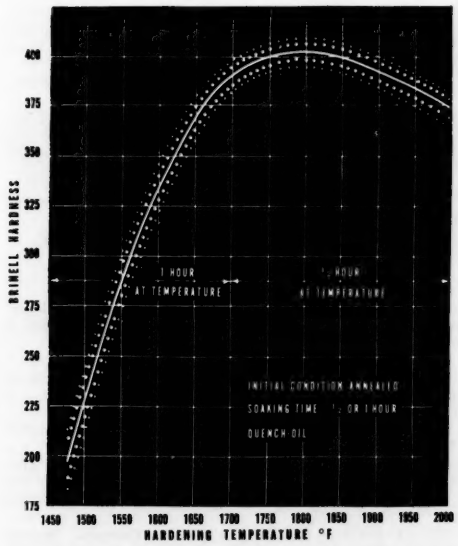
14-132. **A Foundryman's Notebook.** *Iron and Steel,* v. 18, March '45, p. 81.

Positioning and securing cores.

What is the effect of Hardening Temperature

ON THE QUENCH HARDNESS OF STAINLESS STEEL?

TYPES 410, 403 and 416



When certain intermediate hardness ranges are specified, as they sometimes are for stainless steel types 410, 403 and 416, the data in this chart can often be usefully employed. This chart is typical of the type of authoritative information contained in Rustless' booklet, "Heat Treatment of Stainless Steels." This comprehensive booklet was designed specifically for metallurgists, engineers and shop men. Much of the material has never before been published. Subjects treated include hardening, surface hardening, stress-relieving, tempering and annealing, and in addition type of equipment, furnace atmospheres, removal of scale, passivation, and hardness testing. This invaluable booklet contains 56 pages, plus removable cards containing condensations of the instruction for each standard grade of stainless. Sent free upon request.

SALES OFFICES:
BALTIMORE • BUFFALO • CHICAGO
CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • MILWAUKEE • NEW YORK
PHILADELPHIA • PITTSBURGH • ST. LOUIS
DISTRIBUTORS IN PRINCIPAL CITIES

Rustless

Producing STAINLESS STEELS *Exclusively*

RUSTLESS IRON AND STEEL CORPORATION

BALTIMORE 13, MARYLAND

Mention R913 When Writing or Using Reader Service.

14-133. **The Hows and Whys of Centrifugal Casting.** Harold B. Zuehlke. *Aluminum and the Non-Ferrous Review,* v. 9, Oct.-Dec. '44, pp. 60, 62-63.

Advantages and disadvantages of graphite molds; mold draft; mold wall protection; measuring metal poured; condition of metal at time of pouring; special procedure for larger castings; advantages.

15. SALVAGE AND SECONDARY METALS

15-11. **Production of Steel From Battlefield Scrap.** *Steel,* v. 116, April 2, '45, pp. 105, 146.

Battlefield and arsenal scrap has no deleterious effect on finished steel, provided problem is recognized as one of proper scrap segregation. Chromium content can be reduced through slag removal in the open-hearth and nickel and molybdenum through dilution with carbon steel scrap.

16. FURNACES AND FUELS

16-35. **Diesel Gas Engine Cuts Fuel Consumption 25 Per Cent.** Ralph L. Boyer. *Iron Age,* v. 155, March 29, '45, pp. 61, 112.

Development which permits use of either gas or oil as fuel without any electrical sparking device, and which cuts fuel consumption of gas engines from 20 to 25%.

16-36. **Electric Furnace Capacity.** John McBroom. *Foundry,* v. 73, April '45, pp. 115, 235-236.

Method which determines the size shell for any size heat.

16-37. **Application of Gas Burner Equipment to Existing Furnaces.** A. H. Koch. *Steel Processing,* v. 31, March '45, pp. 179-182.

Radiation losses; heat removed by charge; heat input required; burner capacity.

16-38. **Foundry Fuel.** W. J. Driscoll. *Iron and Steel,* v. 18, March '45, pp. 75-80.

How a simple analysis of the fuel input to a foundry, and of the way in which the heat contained in that fuel is expended, may lead to appreciable fuel economies provided that the implications of the results of the analysis are understood and acted upon.

16-39. **Flues for Modern Open-hearth Furnaces.** A. G. Arend. *British Steelmaker,* v. 11, March '45, pp. 128-130.

Dust; corners and bends; specialized metals required.

16-40. **Some Factors in Design of Pulverized Coal Furnaces.** *Combustion,* v. 16, March '45, p. 49.

Furnace shape; early steps in water cooling; types of firing.

16-41. **Anthracite Additions to Coke Oven Coal Mixtures for the Production of Blast Furnace Coke.** D. L. Newkirk. *Blast Furnace & Steel Plant,* v. 33, April '45, pp. 461-463.

Anthracite additions to coke oven coal mixtures resulted in improvement of foundry coke.

16-42. **Uses of Gases in the Foundry.** Harold Haynes. *Foundry Trade Journal,* v. 75, March 15, '45, pp. 209-213.

Utilizing town or producer gas for heating and drying.

16-43. **The Scope and Limitations of Radiant Heating in Drying Processes.** H. Silman. *Foundry Trade Journal,* v. 75, March 15, '45, pp. 217-221.

Methods which will find an important place in mass-production schemes. 9 ref.

17. REFRACTORIES AND FURNACE MATERIALS

17-20. **Properties of Refractories.** J. A. Kayser. *Foundry,* v. 73, April '45, pp. 113-114, 224, 226, 228.

Properties of the various types of refractories. Methods of manufacture which have some bearing on the properties and the shortcomings and advantages. (Presented at the eighth annual Foundry Conference, Milwaukee.)

18. HEAT TREATMENT

18-80. **Sub-Zero Treatment of Steels.** H. C. Amtsberg. *Tool & Die Journal,* v. 10, March '45, pp. 101-103, 110-114.

Presentation of the fundamentals of cooling hardened steels to temperatures considerably below room temperature properly correlated with the basic treatment cycle and related structural changes. 11 ref.

18-81. **Some Metallurgical Principles for the Efficient Heat Treatment of Steel.** Arthur Dube and S. L. Gertsman. *Canadian Mining & Metallurgical Bulletin,* No. 395, March '45, pp. 165-183.

Developments of last 15 years by metallurgical research in the field of heat treatment of steels. Practical aspects of these developments emphasized. Methods of representation of the phase change during austenitizing and sub-critical transformation of austenite described and importance of time-temperature-transformation charts for the planning of heat treatment cycles.

18-82. **Heat Treating High Speed Steels.** H. E. Lewis. *Steel Processing,* v. 31, March '45, pp. 159-163, 186-187.

Types of high speed steels; tools and dies; heat treating temperatures and process; sub-zero treatment; cyanide nitriding; equipment required for heat treating high speed steel; furnace operations; installation; forging.

18-83. **Heat Treatment of Magnesium Alloys.** D. Burks, R. F. Thomson and W. E. Jominy. *Foundry,* v. 73, April '45, pp. 100-103, 236, 238.

Data on the effect of pouring temperature, initial structure, heating rate prior to solution treating, solution temperature, solution time, cooling rate from the solution temperature, aging temperature and aging time on resultant static physical properties and microstructure of fine grained 6% aluminum, 3% zinc alloys. A brief study of dimensional changes during heat treatment is included. 1 ref.

(Continued on Page 12)

They're our specialty

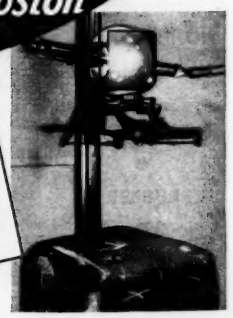
We've made thousands of them for heat-treating, pickling, plating and handling of small parts through production. Those shown are in the heat-treating department of the Republic Drill & Tool Co., Chicago.

We may have prints or patterns suitable for your needs. Our engineers will help you select the basket best suited to your needs or will assist in designing. Send for Bulletin 14 showing typical baskets, trays, fixtures and retorts.

Stanwood Corporation
4809 W. Cortland St. Chicago 39, Ill.

Mention R914 When Writing or Using Reader Service.

THERMALLOY
X-RAY Inspected Castings
Heat and Corrosion Resistant



- MUFFLES
- RETORTS
- LEAD, SALT and
- CYANIDE POTS

ELECTRO-ALLOYS Division
ELYRIA, OHIO.
MAKERS OF X-RAY Controlled Thermalloy HEAT AND CORROSION RESISTANT CASTINGS
AMERICAN Brake Shoe COMPANY

Mention R915 When Writing or Using Reader Service.

Trans-Atlantic Clipper (built by Boeing) beached for servicing, La Guardia Field Hangars.

Pan American World Airways, at Marine Terminal—La Guardia Field, use, in almost constant service, a Hevi Duty 153012 Box Furnace to anneal aluminum alloy hull and wing pieces as well as miscellaneous steel assembly parts at temperatures ranging from 1000° to 1850° Fahrenheit. Flexibility of use of this furnace for many operations with accurate temperature control and heat distribution contributes largely to speedy round the clock servicing routine.

Send for Hevi Duty Box Furnace Bulletin HD-441

HEVI DUTY ELECTRIC COMPANY
HEVI DUTY ELECTRIC EXCLUSIVELY
MILWAUKEE, WISCONSIN

Mention R916 When Writing or Using Reader Service.

A.S.M. Review of Current Metal Literature — *Continued*

18. HEAT TREATMENT (*cont.*)

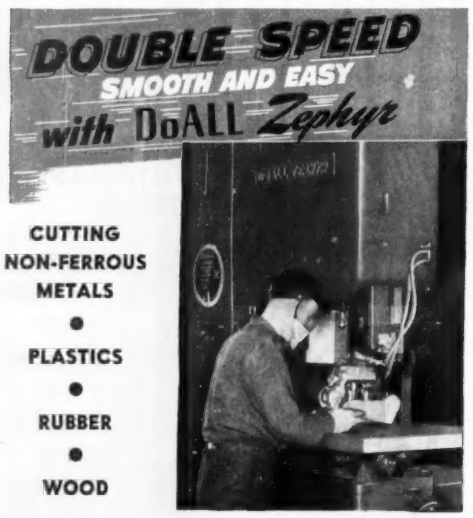
18-84. **ABC's of High Frequency Heating.** Willard M. Woll. *Industry and Power*, v. 48, April '45, pp. 66-67.
Elementary facts as well as up-to-date information on developments in induction and dielectric heating.

18-85. **The Rate of Spheroidization and the Physical Properties of Pearlitic Malleable Iron After Isothermal Quenching.** Walter H. Bruckner and Jun Hino. American Foundrymen's Association *Transactions*, v. 52, June 45, pp. 1189-1216.
Investigations made on the feasibility of reducing the heating cycle required for spheroidization of malleable iron. The investigations included isothermal quenching at temperatures of 1200, 1100, 1000, 900, and 600° F. Photomicrographs are included to show the malleable irons investigated "as received," as isothermally quenched and at various stages of spheroidization.

18-86. **Sub-Zero Treatment of Steels.** H. C. Amtsberg. *Metallurgia*, v. 31, Feb. '45, pp. 165-168.
Fundamentals of cooling hardened steels to temperatures considerably below room temperature properly correlated with the basic treatment cycle and related structural changes.

18-87. **Engineering Properties of Heat Treated Cast Irons.** J. S. Vanick. *American Foundryman*, v. 7, April '45, pp. 11-15.
Simplifies the description of heat treating processes, and contrasts "as cast" with "heat treated" in as simple a comparison as possible.

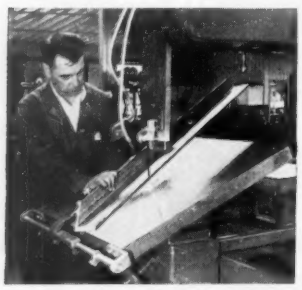
18-88. **Atmosphere Applications — Equipment, Methods and Process Cycles.** Floyd E. Harris. *Metal Progress*, v. 47, April '45, pp. 713-723.
Equipment, operating factors and actual cycles. Principles of equipment and operation: Carburizing; carburizing and diffusion; replacement of surface carbon on decarburized bars; oxide coatings. Manner of correlating this supply and demand commercially.



Here's a machine every operator likes. Its performance is an attention holder every minute. Its speed is a real challenge—there's no waiting for the Zephyr to catch up. It travels just as fast as he cares to make it go, up to 12,000 r.p.m.

The 3,300 pounds of weight make the DoALL Zephyr practically vibrationless when cutting the tough new metals, alloys and laminates used today for war production and in the future for civilian needs.

Your output can be doubled without extra effort. It's just a matter of increasing the speed and guiding the work.



Want to see it work? Phone your DoALL man for a demonstration in your own plant, or write us.

Angle Cutting

Because of the 36" throat and tilting worktable, true angles are cut in 20% to 50% less time than by cut-off methods.

Send for Circular

Learn something about the remarkable performance of the DoALL Zephyr from our latest illustrated circular.

CONTINENTAL MACHINES, INC.
1348 S. Washington Ave. • Minneapolis 4, Minn.
Sales & Service offices in 40 cities

Mention R917 When Writing or Using Reader Service.

18-89. **An Annealing Department Laid Out for Efficiency.** R. K. Weyant. *Wire and Wire Products*, v. 20, April '45, pp. 265-269, 303.
New wire annealing department of the Wilson Steel and Wire Co., Chicago, describing the latest improvements together with a plant layout designed for highest efficiency.

18-90. **Heat Treating Stainless Steels.** *Steel*, v. 116, April 16, '45, pp. 112-116, 118, 120, 160, 162.
Data presented on the correct procedure for heat treating stainless steels, results of research and long practical experience of the metallurgists of the Rustless Iron and Steel Corp. User of these steels is provided with a ready guide for preparing them to take full advantage of their corrosion resistant and mechanical properties.

18-91. **Protective Atmospheres Meet Broad Needs.** *Production Engineering and Management*, v. 15, April '45, p. 99.
Heat treating experience in wartime use of protective gases points to future applications which will permit development of lighter, tougher parts in auto and plane engines. Another field to benefit from advances made today will be powder metallurgy.

19. WORKING
Rolling, Drawing, Pressing, Forging

19-100. **Mechanical and Metallurgical Advantages of Shot Peening.** O. J. Horger. *Iron Age*, v. 155, March 29, '45, pp. 40-49, 100, 102, 104.
An engineering appraisal of the technical and economic utility of compressing the surface layers of design members as a means of greatly improving their fatigue resistance. In this first section of a two-part article, the author details the history of shot peening, describes the treatment of coil and leaf springs, sandblasting effect on fatigue, tempering after peening, and the peening of torsion springs and drive shafts. 37 ref.

19-101. **Fixture Facilitates Positioning of Large Punch Press Dies.** K. B. Jamison. *American Machinist*, v. 89, March 29, '45, p. 105.
Methods used formerly in setting heavy dies in place in punch presses have been discarded in favor of a handling fixture which reduces hazards of damage and injuries to hands of workers.

19-102. **Induction Heating at Timken Forge.** P. D. Aird. *Modern Industrial Press*, v. 7, March '45, pp. 13-14, 16.
Promises to change materially the whole concept of heating steel for forging operations.

19-103. **Designing of Trouble-Free Dies.** C. W. Hinman. *Modern Industrial Press*, v. 7, March '45, p. 22.
Drawing first and second operation shells.

19-104. **Shot for Metal Peening.** Oscar E. Harder and James T. Gow. *Steel*, v. 116, April 2, '45, pp. 111-112, 172.
Materials used in metal peening include chilled iron shot, malleableized chilled iron and a special heat treated shot. Third type has improved resistance to fracturing and hardness ranges suitable for majority of applications. Steel shot is costly and generally not available.

19-105. **Mechanical and Metallurgical Advantages of Shot Peening.** O. J. Horger. *Iron Age*, v. 155, April 5, '45, pp. 66-76, 146, 148-149.
Appraises the technical and economic utility of compressing the surface layers of design members as a means of greatly improving their fatigue resistance. Control of shot peening, treatment of light alloys, shot size and time, liquid blast, and the peening of gears, tank parts and crankshafts. 10 ref.

19-106. **British Investigations Into Reactive Wire Drawing.** F. C. Thompson. *Wire Industry*, v. 12, March '45, p. 135.
British counterpart to the researches described last month by Kenneth B. Lewis.

19-107. **Wire Rope Manufacture.** *Wire Industry*, v. 12, March '45, pp. 139-140.
Production methods at Macwhyte.

19-108. **Stretch-Forming Aircraft Components.** *Machinery* (London), v. 66, Feb. 15, '45, pp. 165-169.
De Havilland methods on light-alloy sections.

19-109. **Production of 8-In. Shells at Christy Park Works of National Tube Company.** Alan B. Salkeld. *Steel Processing*, v. 31, March '45, pp. 164-167, 194.
Billet separation and conveyance; pre-heating furnace; billet heating; piercing press; draw bench; cooling and inspection.

19-110. **Quality Control in a Forge Shop.** John Mueller. *Steel Processing*, v. 31, March '45, pp. 168-172.
Quality control must be carried out as an independent function, responsible to the factory manager. Requirements of personnel organization, chief inspector, and layout man.

19-111. **Greater Output Through Application of Modern Press Design.** R. W. Glasner. *Steel Processing*, v. 31, March '45, pp. 173-175, 194.
Development and advantages.

19-112. **Seven-Roll Round Straightener.** *Steel*, v. 116, April 9, '45, p. 109.
Has unusual combination of rolls; trues up bars or tubing in level passline; removes elliptical sections of workpiece; imparts surface polish by pressure of rolls.

19-113. **Replaces Seamless Tube Mill in Ten Weeks.** *Steel*, v. 116, April 9, '45, pp. 125-126, 128.
Modern unit produces tubes 2⅞ to 7⅝ in. diameter. Large sizing mill is first of its size to be equipped with over-hanging rolls and roller bearings. Cut-off machines built with four cropping units which operate in unison and crop four ends simultaneously. Tubes arrive in inspection department in minimum of time.

19-114. **Development of Aluminum Alloy Forgings and Stampings.** J. Towns Robinson. *Metallurgia*, v. 31, Feb. '45, pp. 182-186.
Of the manipulative processes that have assisted in increasing the usefulness of aluminum alloys, not the least important are forging and stamping. Briefly surveys progress in this field up to the present high standard of production.

19-115. **Selection of Bar Steel Used As-Rolled or Drawn.** John H. Frye. *Metal Progress*, v. 47, March '45, pp. 497-504.
Cold finished bars; effect of cold drawing on tensile properties; use of fractional draft; aging effects; determination of yield strength; strain annealing; cold drawn shapes.

19-116. **Marine Engines.** Robert Liston. *Iron and Steel*, v. 18, March '45, pp. 105-108.
Manufacture of large forgings.

19-117. **Metal Forming With Plastic Punches.** G. H. P. *Machinery* (London), v. 66, March 15, '45, pp. 277-283.
Use of plastic punches in combination with zinc alloy dies has proved that important advantages can be derived from this practice. Plastic punches will form metal parts in zinc alloy dies more consistently than the lead punches formerly in use.

19-118. **Aluminum Forgings.** S. V. Malcuit. *Metal Industry*, v. 66, March 23, '45, pp. 186-188.
Aluminum forgings are primarily used in parts heavily stressed in fatigue and impact. Provides recommendations for achieving high quality forgings and at the same time simplifying their production. (From *Metals and Alloys.*)

19-119. **Dimpling Tool for High Strength Aluminum Alloys.** *Iron Age*, v. 155, April 12, '45, p. 67.
Martin spin dimpler for dimpling hard and brittle sheet metals such as Reynolds 301-T, Alcoa 75S-T aluminum alloys and the new light weight magnesium alloys.

19-120. **Formed Sheet Metal Parts Classified by Shape. II.** Mark P. Meinel. *Product Engineering*, v. 16, April '45, pp. 241-244.
Critical design factors are listed for contoured flanged parts of non-uniform cross-section and for double curvature parts.

19-121. **Extrusion of Nickel Alloys Now Possible in This Country.** H. M. Brown. *Machinery*, v. 51, April '45, pp. 162-169.
Technique employed in extruding large tubes in a 4000-ton hydraulic press by a process that reduces scrap loss to a minimum.

19-122. **Shot Peening Now Widely Used for Increasing Fatigue Resistance.** Charles O. Herb. *Machinery*, v. 51, April '45, pp. 170-179.
Process that in the days before the war was employed primarily for strengthening springs is now applied to a wide variety of parts, including gears, crankshafts, connecting-rods, and even aircraft propeller blades.

19-123. **Punching.** William C. Tucker. *Machine Tool Blue Book*, v. 41, April '45, pp. 135-136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158.
Pertains to punching, punching tools, and punch machines.

19-124. **Seamless Tubes Made in Mill of Latest Design at Plant of Pittsburgh Steel Company.** *Blast Furnace & Steel Plant*, v. 33, April '45, pp. 464-468.
New mill designed to roll tubes in sizes from 2⅞ to 7⅝ in. outside diameter in a wide range of wall thicknesses and lengths. Its design and layout permit straight line, high speed production, and its oversize operating parts mounted in extra heavy anti-friction bearings make possible the rolling of material to much more exact dimensions.

19-125. **Flanging Tubes.** *Iron and Steel*, v. 18, March '45, p. 108.
Using a flange rolling machine, time for forming and cutting off tubing is reduced to about two minutes. The metal is working continuously during heating and forming, producing uniform results.

20. MACHINING AND MACHINE TOOLS

20-100. **Operations in the Production of the "Bristol" Hercules Engine.** *Machinery* (London), v. 66, Feb. 8, '45, pp. 137-140.
Thread rolling and gear shop methods.

20-101. **Securing Fine Surfaces.** H. J. Wills and H. J. Ingram. *Machinery* (London), v. 66, Feb. 15, '45, pp. 181-182.
Production lapping of ground internal and external cylindrical surfaces.

20-102. **Machining Steel Parts on Automatic Screw Machines.** *Machinery* (London), v. 66, Feb. 15, '45, p. 183.
Speed of cutting; power; avoidance of unsupported overhang; coolants.

20-103. **Centerless Grinding of Screw Threads.** Morris Gjesdahl. *Iron Age*, v. 155, March 29, '45, pp. 52-55, 106, 108.
Small headless socket screws are being ground on a production basis at a rate of 60 to 70 per min. on the first centerless type grinder developed for thread work. Design and operating principles of this revolutionary type of machine, which employs a crushed rib wheel, are described.

20-104. **Proper Sharpening Preserves Cutter Life.** M. Martellotti. *American Machinist*, v. 89, March 29, '45, pp. 98-100.
Milling cutters are expensive tools and should be handled with care in order to get efficient cutting action.

20-105. **Recommended Grinding Practice for Round and Concentric Holes.** Stuart St. John. *American Machinist*, v. 89, March 29, '45, pp. 102-104.
Inability to meet requirements for close tolerance is often traceable to simple mistakes. Method of holding the part, the sequence of operations and the balance of the part and holding device important.

20-106. **Practical Ideas.** *American Machinist*, v. 89, March 29, '45, pp. 119-124.
Radio plugs precision-soldered on semi-automatic machine. Top and side chipbreakers ground at same setup. Accurate drilling obtained by grinding chuck jaws in machine. Deformed welding tips reshaped by simple swaging die. Four-station lathe carriage stop with an indexing pin. Bevel gear backlash determined by micrometer indicating gages. Special star gage for bomb-bay door screw. Additional life for cup-shaped grinding wheels. Flame cutting free-flowing curves by use of a flexible track. Large tubes cut uniformly by rotary-burning torch. Outboard bearing provides an arbor support for milling unit.

20-107. Centerless Thread Grinding. *Steel*, v. 116, April 2, '45, pp. 102-104, 134, 136, 138, 140, 142, 144.

Method is developed for applying centerless grinding principles in producing screw threads on hardened steel blanks at high speed. Half-inch screws ¼ in. in diameter threaded at rate of 85 per min.

20-108. The Proper Care and Selection of Industrial Diamonds. Sheldon M. Booth. *Tool & Die Journal*, v. 10, March '45, pp. 106-108.

Importance of careful selective buying of these diamonds for specific uses. Type of setting in which the diamond is mounted and the nature of the tool in which it is to be used. Best methods of wheel dressing with diamond tools in order to prolong the life of the diamond.

20-109. Landis Centerless Thread Grinder. *Modern Machine Shop*, v. 17, April '45, pp. 184-186, 188, 190, 192, 194, 196, 198, 200.

Presenting a new development in the field of screw threads, by means of which a thread is generated from the solid in a continuous operation.

20-110. Selecting Carbides for Milling. Fred W. Lucht. *Railway Mechanical Engineer*, v. 119, April, '45, pp. 165-166.

Grinding and cutter design are important; feeds and speeds; the selection of grades; the milling of steel, cast and malleable irons; non-ferrous alloys.

20-111. Ball-Bearing Spindles for Precision Applications. W. Boneham. *Machinery* (London), v. 66, Feb. 22, '45, pp. 201-204.

Advantages of the ball-bearing spindle compared with the plain bearing type.

20-112. Grinding Accurate Cam Surfaces. P. S. *Machinery* (London), v. 66, Feb. 22, '45, pp. 205-208.

Points to be considered in grinding cams, eccentrics and elliptical or relieved pistons.

20-113. Form Grinding. *Automobile Engineer*, v. 35, March '45, pp. 111-113.

Advantages in the use of crusher-dressed abrasive wheels.

20-114. Milling Heavy Aluminum Alloy Forgings and Turnings. Thomas E. Piper. *Aluminum and Magnesium*, v. 1, March '45, pp. 18-19, 30.

Recent development of new, light and high strength aluminum alloys and the application of highly heat treated steel alloys for aircraft has presented the industry with many machining problems as well as the grinding problem noted. Tool and cutter designs will vary for every application depending upon the material and its condition.

20-115. Centerless Grinding of Screw Threads—a Revolutionary Development. *Machinery*, v. 51, April '45, pp. 188-195.

When centerless grinding of plain cylindrical surfaces was first introduced, the process was looked upon as revolutionary in shop practice—now screw threads are being ground commercially by the centerless method on equipment developed by the Landis Tool Co.

20-116. Selecting the Correct Speeds and Feeds for Cylindrical Grinding. S. S. Shoemaker. *Machinery*, v. 51, April '45, pp. 210-211.

Determining traverse and in-feed of wheel. Good surface quality requires reduced traverse; depth of cut, or infeed. The grinding of cast iron.

20-117. Centerless Grinding of Screw Threads. James R. Custer. *Automotive Industries*, v. 92, April 1, '45, pp. 23, 108, 110, 112.

In its present state of development, centerless grinding is being applied in production to thread in one pass hardened socket set screw blanks in sizes from 0.112 in., 40 pitch (No. 4) to ⅝ in., 11 pitch. Using an automatic loader, the hourly rate can be increased to 5200.

20-118. Flexible Tooling for Production Economy. Frank M. Scotten. *Production Engineering and Management*, v. 15, April '45, pp. 70-73.

Tooling for tire manufacture, from first machining of rough casting to finishing, demands cooperation between shop and engineering. Goodyear controls and methods, which satisfy broad production requirements, include grinding forming tools from designer's templates.

20-119. Shop Kinks Aid Navy. *Production Engineering and Management*, v. 15, April '45, pp. 74-76.

Adjustable carriage for portable grinder; adapter for inside micrometer; burring machine saves $9000; instrument to read angles in balancing operations.

20-120. Production Tools Boost Output and Assure Quality. *Production Engineering and Management*, v. 15, April '45, pp. 79-83.

In 33 sec., a two-spindle machine with an eight-station rotary table fixture finish mills a die-cast part to plus or minus 0.002 in. Ingenious tooling saves 50%.

20-121. Holder for Broaching on Screw Machines. *Production Engineering and Management*, v. 15, April '45, pp. 89-90.

Shows a type of broach holder for use in turrets of either automatic or hand screw machines.

20-122. Boring Mills Geared for Higher Output. *Production Engineering and Management*, v. 15, April '45, p. 91.

Increase in top machining speeds with scrap loss on all eight machines.

20-123. Centerless Method Applied to Production Thread Grinding. Jerome S. Wilford. *Production Engineering and Management*, v. 15, April '45, pp. 116-117, 198, 200, 202-203.

High production machine, employing formed multi-grooved wheel, is announced as capable of increasing output as much as 500%. Wide range of screw sizes can be processed after heat treatment.

20-124. Controlled Finish on Journals Can be Produced Economically. H. S. Indge. *American Machinist*, v. 89, April 12, '45, pp. 107-111.

Mechanical lapping with coated abrasive strip is a fast means of refining ground journals to surface analyzer readings of two to three micro-inches RMS, and do so on a consistent basis.

20-125. Pneumatic Clamps Speed Slotting of Aircraft Wing Hinges. *American Machinist*, v. 89, April 12, '45, pp. 122-123.

Substantial savings in set-up time have been realized through replacement of manual holding fixtures by air-operated types.

20-126. Methods of Sharpening Peripheral and Formed Profile Milling Cutters. M. Martellotti. *American Machinist*, v. 89, April 12, '45, pp. 124-128.

Practical pointers on the use of several types of abrasive wheels.

20-127. Practical Ideas. *American Machinist*, v. 89, April 12, '45, pp. 129-132.

Combined reamer and tap adjusted by three-step tapered mandrel. Drilling jig for holding steel switch boxes. Thread chasers ground uniformly by clamping in fixture. Aircraft turnbuckle wrench proves a time saver. Air-cooled mandrel promotes accurate production. Aluminum structural shapes joggled with inexpensive tools. Special wrench simplifies removal of landing-gear nut. Copper pipe quickly flanged without requiring machinery. Portable pipe flange refacer saves dismantling equipment.

20-128. Turning and Milling With Negative-Rake Tools. *Machinery* (London), v. 66, March 8, '45, pp. 249-253.

Advantages of negative rake; turning tests.

20-129. Air-Operated Milling Fixtures for Locating and Clamping. *Machinery* (London), v. 66, March 8, '45, pp. 259-261.

Advantages of air-operated clamps, compared with manually operated clamping devices.

20-130. Influence of Wheel Balance in Fine Grinding. H. J. Wills and H. J. Ingram. *Machinery* (London), v. 66, March 8, '45, pp. 263-265.

Causes of the appearance of chatter marks on cylindrical work. Methods and equipment employed to balance wheels; arbors equipped with balancing weights.

20-131. Shaved Aircraft Engine Gears. Charles G. Pfeffer. *Iron Age*, v. 155, April 12, '45, pp. 54-60.

Any gear that can be ground can be shaved, whether it is free quenched or die quenched. Many such gears are now being shaved in production. Shaving is also being done in production on cluster and internal gears which, because of their shape, could not be ground. Altogether, 60 types of gears are being shaved.

20-132. Metal and Plaster Mock Up of Fighter Plane Makes Possible Accurate Checks for Forming Tools. *Steel*, v. 116, April 16, '45, pp. 122, 124.

Tooling for mass production takes less time and expense is reduced by use of full-scale model with framework of wood, steel and dural template stock. Better patterns for cast tools provided by permanent, dimensionally stable model.

20-133. Machining Heavy Duty Gears. W. P. Schmitter. *Steel*, v. 116, April 16, '45, pp. 127-128, 164, 166, 168, 172, 174.

War requires making special gears on mass production basis. Some of the special machining and production methods successfully developed to meet this objective.

20-134. Machinability of Copper Alloys. D. K. Crampton. *Metal Industry*, v. 66, March 16, '45, pp. 166-168.

Effect of microstructure and composition. Significance of the lead particles in breaking the chips in free-cutting brass discussed. Effect of sulphur, selenium and tellurium on the machinability of copper-base alloys. (From *Metal Progress.*)

20-135. Mounting Solid Cemented-Carbide Cutting Blades Mechanically. W. L. Kennicott. *Mechanical Engineering*, v. 67, April '45, pp. 241-243, 254.

Recent development in cemented-carbide cutting tools is the adoption of solid carbide blades, mechanically held in standard or special tool holders. Advantages of solid cutters over the conventional design: Number of regrinds possible on a small-tipped boring tool is very limited; grinding is simpler as the differential-expansion problem is no longer a factor.

20-136. Centerless Thread Grinding. M. S. Gjesdahl. *Machine Tool Blue Book*, v. 41, April '45, pp. 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 198, 200, 202, 204, 206, 208.

Machine grinds accurate smooth threads on hardened steel set screw blanks in a single operation. Rate of production shows a decided increase over that of the present methods of cutting threads on screws.

20-137. Selecting Carbides for Milling. *Machine Tool Blue Book*, v. 41, April '45, pp. 230, 232, 234, 236.

Grinding; cutter design; feeds and speeds; vibration and chatter.

20-138. Milling Airplane Cylinder Head Fins. *Machine Tool Blue Book*, v. 41, April '45, pp. 276-278.

Special machine for milling the circular, partial and dome fins on forged aluminum airplane heads which handles in two operations the milling of the same number of fins which formerly required four machines.

20-139. Favored Practice in Machining Zinc Alloy Die Castings, IV. *Die Castings*, v. 3, April '45, pp. 64, 66, 72, 74.

Skiving; boring.

New
KENNAMETAL
"Universal"
BLANKS

STYLE S-000

FACILITATE TOOL MAKING
and Keep Stocks Down

These new Kennametal "Universal" tool blanks are literally "jacks-of-all-trades." Rectangular in shape, with 12° clearance angle formed on one long edge, they can be used to make many different types of tools, simply by setting them into open-end recesses, as illustrated. They are available in all recognized standard sizes, many of which are stocked in several grades.

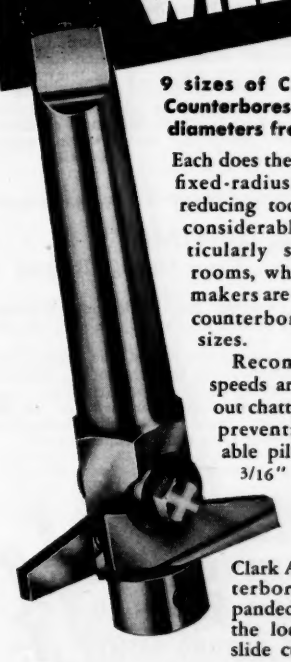
Their use reduces inventory investment, and simplifies stock room problems. And, above all, they make it easier for you to employ on a wide-spread, yet economical scale, the advantages of Kennametal—its ability to cut metal, including steel up to 550 Brinell hardness, accurately, at greatly increased speed, with amazing tool life.

Catalog particulars, and prices, are yours for the asking.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

Mention R918 When Writing or Using Reader Service.

WHY USE 63 WHEN 9 WILL DO?

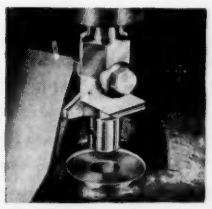


9 sizes of Clark Adjustable Counterbores cut all fractional diameters from ¼" to 5½".

Each does the work of 7 or more fixed-radius cutters, thereby reducing tool inventory costs considerably. They are particularly suitable for tool rooms, where tool and die makers are constantly needing counterbores of different sizes.

Recommended surface speeds are faster, and without chatter. Exclusive, burr-preventing interchangeable pilots available from 3/16" up, by sixteenths.

Clark Adjustable Counterbores are easily expanded. Simply loosen the locking bolts and slide cutting blades in or out. Blades are removable for sharpening.



No de-burring of pilot holes necessary.

Clark Counterbores spot face as well as bore.

Write for bulletin MR-5-CB and call your Clark Cutter Jobber today.

CLARK CC CUTTERS
Robert H. Clark Company
4330 SANTA MONICA BOULEVARD · BEVERLY HILLS, CALIFORNIA

Mention R919 When Writing or Using Reader Service.

A.S.M. Review of Current Metal Literature—*Continued*

21. LUBRICATION AND FRICTION; BEARINGS

21-27. **Copper-Lead-Silver Bearings Developed by Ford.** *Iron Age*, v. 155, March 29, '45, pp. 50-51.

A high lead (35 to 40%) copper bearing containing 4½ to 5% silver. Silver prevents segregation of the lead and resultant fatigue. The new "tri-alloy" bearing will give two to three times the service life of conventional bearings even under the most severe conditions.

21-28. **Bearing and Tool Damage by Welding or Galling.** E. L. Hemingway. *Machinery* (London), v. 66, Feb. 15, '45, pp. 171-177.

Reasons and theory of galling, and gives pertinent data on how this action can be minimized. Bearing metals, and other important data on bearing performance discussed. (From *Iron Age*.)

21-29. **Lubrication in Deep Drawing Metals.** Samuel Spring. *Steel*, v. 116, April 2, '45, pp. 109-110, 158, 160, 162, 164, 166, 168, 170.

Application of lubrication theory to deep drawing, effect of engineering and metallurgical factors conducive to excessive welding of work and tools, prevention of buildup and seizure, and an interesting hypothesis on the mechanism of metal buildup on tools. 11 ref.

21-30. **Film Lubrication of Parallel Thrust Surfaces.** A. Fogg. *Engineering*, v. 159, Feb. 16, '45, pp. 138-140.

Determination of the load-carrying capacity of existing types of thrust bearing, such as the Michell bearing, under the special operating conditions. Systematic investigation of various modifications to a plain annulus. Loads of the same order of intensity could be carried on simple fixed pads.

21-31. **Oil Grooves in Plain Bearings.** D. Clayton. *Engineering*, v. 159, Feb. 23, '45, pp. 158-160.

Effect of holes and grooves on the behavior of plain bearings.

21-32. **Machine Lubrication.** G. W. Birdsall. *Steel*, v. 116, April 9, '45, pp. 110-113, 128, 130.

Can be made extremely profitable as shown by remarkable savings recorded from use of properly engineered centralized lubrication systems. Improved lubrication equipment provides outstanding economies by reducing time, manpower and lubricants required, while increasing bearing life and machine output.

21-33. **Lubrication in Deep Drawing Metals.** Samuel Spring. *Steel*, v. 116, April 9, '45, pp. 114, 116, 118, 120, 122.

General properties of drawing lubricants and their composition. Includes reduction of friction, ease of application and removal, stability, non-corrosiveness and economy. 6 ref.

21-34. **Lubrication Progress Paces Ball and Roller Bearing Developments.** *Lubrication*, v. 31, Feb. '45, pp. 13-24.

Trends in ball and roller bearing lubrication: High speeds; sealed bearings; wider speed limits; controlled lubrication; all-temperature greases; wider temperature ranges; prepacked grease lubrication; greater use of precision bearings; use of spray or oil-mist lubrication on high speed oil-sealed bearings; rust and oxidation resistant lubrication; means for re-lubricating sealed bearings.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-167. **Electronic Controls for Resistance Welding.** H. L. H. *Machinery* (London), v. 66, Feb. 8, '45, pp. 143-148.

Controlling the heat generated at the weld; nonsynchronous and synchronous timing control; elements of the spot-weld cycle; classification of timers; control of voltage variation; electronic control for the storage-type of welder; resistance welding before the war; electronic controls with special functions.

Wide variety in size, weight, operation and pulling head position have been designed into the standard line of Cherry Rivet guns so that you may have just the right gun for your particular Cherry Blind Rivet applications.

There are five guns . . . one pneumatic and four hand-operated . . . designed to handle any blind or hard-to-get-at installation easily and quickly. For further details about Cherry Rivets and guns, write for Manual D-45, Dept. A-316, Cherry Rivet Company, 231 Winston Street, Los Angeles 13, California.

CHERRY RIVETS. THEIR MANUFACTURE AND APPLICATION ARE COVERED BY U. S. PATENTS ISSUED AND PENDING

Cherry Rivet Company
LOS ANGELES, CALIFORNIA

Mention R920 When Writing or Using Reader Service.

22-168. **Welding of Aluminum and Its Alloys.** J. R. Morrill. *Western Metals*, v. 3, March '45, pp. 9-11.

Discusses some of the principal factors relating to the use of this modern process as it is now being successfully practiced.

22-169. **Nation's Welded Pipe Line Construction During War Years Totals Over 18,000 Miles.** C. M. Taylor. *Petroleum Engineer*, v. 16, March '45, pp. 143, 146, 148, 150.

Stove-pipe method of welding continues as trend in construction of pipe lines; widely used on large sizes.

22-170. **Pressure Welding Overland Pipe Lines.** E. P. Jones. *Petroleum Engineer*, v. 16, March '45, pp. 214, 216, 218, 220.

Major features of the pressure welding process and outlines some of the recent developments in process and equipment.

22-171. **Spot Welding of Magnesium Alloys.** Kenneth E. Dorcas and N. H. Simpson. *Iron Age*, v. 155, April 5, '45, pp. 50-53.

Optimum machine settings on two types of stored energy welders have been worked out experimentally for various gages of magnesium alloys. In an attempt to improve shear strength values and their consistency a chemical precleaning technique has been developed that is superior to wire brushing in many respects. The relative effectiveness of chemical protective finishes applied after spot welding has also been studied.

22-172. **Cost of Welded Structures Compared With Iron Castings.** W. J. Conley. *Iron Age*, v. 155, April 5, '45, pp. 58-61.

To disprove the statement that certain finish machined weldments cost twice as much as finished castings, the results of an informal survey of welding fabricators made by his company both here and abroad are summarized.

22-173. **Sequence Control for Automatic Riveting.** Walter Mandel. *Iron Age*, v. 155, April 5, '45, pp. 62-64.

Electronic sequence control for increasing the efficiency of Model 2002 Erco riveters.

22-174. **Modern Applications of Arc Welding.** W. J. Conley. *Steel Processing*, v. 31, March '45, pp. 176-177, 183-185.

Its many advantages for increased production.

22-175. **Resistance Welding.** *Railway Mechanical Engineer*, v. 119, April '45, pp. 166-168.

Distinctions between various applications of the process.

22-176. **Flash Welding SAE 4130 Steel.** W. W. Ackerman and Walter Pestrak. *Steel*, v. 116, April 9, '45, pp. 104-105, 140, 142, 144, 146.

Advantages of the flash welded joint over the fusion welded joint are: Better physical characteristics (100% joint strength); lower weights; cheaper and faster production with less operator skill; no warping as a result of welding; less brittleness at low temperatures such as are encountered at high altitudes; higher fatigue strength.

22-177. **Influence of Inclination of Welds to Direction of Stress.** *Combustion*, v. 16, March '45, pp. 45-47.

When computing welds it is common practice to assume a higher joint efficiency along the weld than perpendicular to it. Consequently, inclination of the weld in the direction of stress should bring about an increase in load, and this assumption has led to some firms adopting spiral welds in pipe lines and drum construction. Tests on tensile bars and model drums, however, have now shown that it is only with relatively low joint efficiencies and very small angles between the axis of the weld and the principal direction of stress that any real increase in load can be achieved.

22-178. **Silver Alloy Brazing.** A. M. Setapen. *Metal Industry*, v. 66, March 23, '45, pp. 180-183.

Use of silver brazing alloys has increased many fold, and concurrently there has been a decided trend towards high speed production methods of heating. Prominent among these is the use of electric induction. (Presented to the Electrochemical Society.)

22-179. **Atomic Hydrogen Welding of Cutting Tools.** Eric N. Simons. *Industry and Welding*, v. 18, April '45, pp. 30-31, 94-96.

New British process solves problem of lost carbon and hardness, and results indicate test tools can be used on materials of all types, ranging from low carbon steel to hard and tough alloy steels having a tensile strength of 100 tons per sq. in.

22-180. **Building and Welding Braces in Heavy Industry.** E. E. Gentry. *Industry and Welding*, v. 18, April '45, pp. 32-33.

Method saves time, work and material and speeds up production and is safer.

22-181. **The Welding Processes at Boeing.** Charles Thompson. *Industry and Welding*, v. 18, April '45, pp. 34-37, 92-93.

Five forms of welding utilized at Boeing, namely, oxy-acetylene, oxygen-hydrogen, electric arc, flash and spot welding. Tells how each is applied.

22-182. **Arc Welding Propeller Shaft and Collar.** Herb Hose. *Industry and Welding*, v. 18, April '45, pp. 44, 46.

Shaft and collar welded with coated aluminum bronze electrodes received no preparation of any kind except preheating to approximately 400° F. Only two passes were required to deposit a ⅝-in. fillet.

22-183. **Bending and Straightening With the Torch.** *Industry and Welding*, v. 18, April '45, pp. 48-49, 53, 55, 82-83.

Application of heat to a localized area of metal in such a way that the resulting expansion is hindered by surrounding rigid cold metal, causing the hot metal to upset. Upon cooling, the steel contracts in at least one direction, to a length less than its original length. Material prepared by La Motte Grover and Forest Walds of Air Reduction Sales Co., presentation of the Canadian Welding Review. Recapitulates much of the material originally given on the subject in *Industry and Welding* during 1941-42.

22-184. **Basic Joint Design for Welding Process.** C. H. Jennings. *Industry and Welding*, v. 18, April '45, pp. 56-58, 60, 62.

Forge, acetylene and thermit described. Welding is accomplished in five principal ways: (1) Forge welding, (2) gas welding, (3) thermit welding, (4) electric arc welding and (5) resistance welding.

22-185. **Submerged Arc Welding Steps Up Production of Invasion Boat Assemblies.** *Industry and Welding*, v. 18, April '45, pp. 78-80.

Welding of large, flat plate sections has been found ideally suited to the submerged arc type of automatic welding, due to high welding speed with a minimum of distortion, and exceptionally fine quality of work.

22-186. **Rod Processing Plant.** *Industry and Welding*, v. 18, April '45, pp. 86-87.

New principle of extruded flux application. Centralized control panel by which one man can start and stop every unit in the plant, compact seven-pass oven saving 40% on floor space. Improved mechanism which transfers the electrodes from one pass within the oven to the next in accurate alignment without dropping or rolling. A new type of slug press.

22-187. **The Welding of Process Piping.** Arthur N. Kugler. *Heating and Ventilating*, v. 42, April '45, pp. 71-74.

Metal arc welding process is the method preferred for welding straight chromium irons and steels and the austenitic chromium-nickel steels, since shielded arc electrodes are available for use with virtually every analysis of base metal. Brazing with the silver-cadmium-copper-zinc alloy offers possibilities where the heat of welding might cause difficulties with these critical alloys. Application of the gas shielded arc welding process is so new that complete data are not available. Braze welding is included as a possible process but its use should be restricted to emergency repairs or those situations where the copper-base alloy filler metal will not cause trouble.

22-188. **A Quantitative Study of Soft Soldering by Means of the Kollagraph.** L. G. Earle. Institute of Metals *Journal*, v. 71, Feb. '45, pp. 45-72.

"Jointing capacity" may be analyzed into two independent characteristics of the soldering system: Its time-temperature-wetting characteristic and its interfacial-tension characteristic. An apparatus, called the Kollagraph, for measuring these two independent characteristics, described. Effect of the tin content of the solder, the alloy additions to the solder, the basic stock, the thickness of the stock, the type of flux, and preheating are discussed; the general conclusion is reached that most types of solder are selective in their reaction to different basis stocks and fluxes. 8 ref.

22-189. **Spot Welding of Magnesium Alloys.** Kenneth E. Dorcas and N. H. Simpson. *Iron Age*, v. 155, April 12, '45, pp. 68-73.

Results of tests of many cleaning agents before a chemical cleaner was developed that is comparable in its effect to wire brushing, according to readings on a surface resistance meter devised at Fort Worth. Relative effectiveness of chemical protective finishes applied after spot welding is also revealed.

22-190. **Brazing Small Assemblies—a Cost and Quality Comparison.** O. A. Kehle. *Product Engineering*, v. 16, April '45, pp. 274-276.

Small, complicated parts analyzed for possible production as furnace-brazed sub-assemblies. Cost comparisons between brazed assemblies and machined parts or forged and machined parts included.

22-191. **Oxy-Acetylene Pressure Welding Has Wide Production Possibilities.** *Machinery*, v. 51, April '45, pp. 180-187.

Originally applied to operations in the railway and oil fields, it is being increasingly employed in factory production. Oxy-acetylene pressure welding is an automatic process in which the work-pieces are joined while in the solid state without the addition of any melted metal. Process is especially adaptable to the welding of high carbon and alloy steels, which are welded with difficulty by fusion methods.

22-192. **The Aim of Welding — One Quality — the Best.** E. Fuchs. Institute of Welding *Transactions*, v. 7, Nov. '44, pp. 104-115.

Shows from specific cases that any but the best welding does, in fact, lead to failures, and indicates how certain well-defined faults can largely be avoided. 1 ref.

THE New
TINNERMAN
HOSE
CLAMP
Latch by hand
Lock with pliers
Remove with screwdriver
This one-piece, ratchet type Hose Clamp is easily latched by hand, then quickly locked with pliers. Removed by prying locking tongue out of ratchet teeth with screwdriver. It weighs less, has a lower profile, exerts uniform pressure, and may be used over and over again. Approved by Army and Navy Air Forces. Sizes from ½" O.D. up. Write for details.
TINNERMAN PRODUCTS, INC.
2026 Fulton Road, Cleveland 13, Ohio

Mention R921 When Writing or Using Reader Service.

22-193. **Propeller Shaft Struts.** *Steel*, v. 116, April 16, '45, pp. 110-111.
Fabricated by Thermit welding.

22-194. **Sequence of Operations in Ship Welding.** Jack D. Wadling. Institute of Welding *Transactions*, v. 7, Nov. '44, pp. 116-122.
Diverse nature of problems which confront the designers and builders of welded ships and the almost insuperable difficulties of laying down hard and fast rules covering such items as sequence of welding.

22-195. **Arc Welding Procedure With Special Reference to Shipbuilding.** W. G. John. Institute of Welding *Transactions*, v. 7, Nov. '44, pp. 123-128.
Welding techniques are still in the development stages, but general guidance can be given, and investigations are proceeding. Consideration is given to the importance of welding procedures as affecting structural efficiency and economy of production; design of butt joints; use of fillet welds; positioning of the work; large gage electrodes and deep penetration welding; peening; automatic welding; welding on structural forgings and castings and heavy material. Attention is drawn to the need for planning the work, training the welder and providing effective supervision.

22-196. **The Pickling of Alclad D.T.D. 390 and Duralumin B.S.S. 5L3 Prior to Spot Welding.** R. F. Tylecote and R. W. Pittaway. Institute of Welding *Transactions*, v. 7, Nov. '44, pp. 129-136.
Pickling of light alloys prior to spot welding must be regarded from two points of view: (1) That of reducing the resistance due to the oxide film present on the surface of the sheets in contact with the electrodes, i.e. the electrode-sheet contact resistance; and (2) reducing the contact resistance between the sheets, i.e. sheet-to-sheet resistance. Shows the advantages to be gained by reducing the sheet-to-sheet resistance. 1 ref.

22-197. **Use of High Frequency Ionizing Devices for Arc Welding.** H. P. Zade. *Welding*, v. 13, March '45, pp. 50-53.
Physical phenomena relating to the welding arc discussed in brief. Advantages of an additional ionization of the arc stream. Method of providing ionization by means of superimposed high frequency current, and the application to arc welding problems.

22-198. **Manual Carbon Arc Welding.** P. L. Pocock. *Welding*, v. 13, March '45, pp. 54-60.
Investigations carried out on different materials and with different joints. Results tabulated.

22-199. **Design of Welded Structures. Part II.** J. Corston MacKain. *Welding*, v. 13, March '45, pp. 61-67.
Water storage tanks.

22-200. **Zinc Base Die Castings.** E. Christie. *Welding*, v. 13, March '45, pp. 68-70.
Explains the problem of welding this type of die casting and describes the best procedure for repair work; emphasizes that this class of repair calls for considerable skill and experience.

22-201. **Arc Welded Engine Mountings.** *Welding*, v. 13, March '45, pp. 73-80.
Production of Avro-Lancaster sub-frames; crack detection; drilling operations.

22-202. **Treadle-Operated Spot Welders.** E. Leede. *Welding*, v. 13, March '45, pp. 81-82.
Interlocking device designed to correct the bad habit of not pressing the treadles of non-automatic spot welders down to the full extent.

22-203. **Oxy-Acetylene Welding of Copper.** *Aluminum and the Non-Ferrous Review*, v. 9, Oct.-Dec. '44, pp. 56, 58-59.
It has been found that the successful welding of copper depends upon base material and alloy filler rod of suitable composition, a suitable flux conveniently applied, correct welding technique and experience.

22-204. **Heliarc Welding of Aluminum.** *Welding Engineer*, v. 30, April '45, pp. 34-37.
Heliarc welding process was originated for the arc welding of magnesium, but it can be successfully used for aluminum. Curtiss-Wright technicians found Heliarc welding satisfactory for the fabrication of big airplane wing tanks.

22-205. **Sequence for Shipbuilding.** Milton Forman. *Welding Engineer*, v. 30, April '45, pp. 42-43.
Organized fitting and welding is the cornerstone for shipbuilding practices at Ingalls yard. A successful welding sequence must be an integral part of the planning and the construction of every vessel.

22-206. **Flame-Cut Expansion Joints.** R. M. Dennis. *Welding Engineer*, v. 30, April '45, pp. 44-45.
Silent, joltless, and trouble-free expansion joints for highway bridges are being produced by flame-cutting a series of interlocking "fingers" in thick steel plate.

22-207. **Flash Welding 4130 Steel.** W. W. Ackerman and Walter Pestrak. *Welding Engineer*, v. 30, April '45, pp. 46-49.
While SAE 4130 steel is of outstanding weldability, it presents some problems in flash welding. Parts must be properly designed for this application, and flashing and upset times as well as upset pressures are critical.

22-208. **Welding in the Railroad Shop.** Arthur Havens. *Welding Engineer*, v. 30, April '45, pp. 38-40.
Railroad welding jobs fall naturally into those that are done by oxy-acetylene welding, and those done by arc welding. Cites a number of examples of each.

22-209. **Elements of Tool-Steel Welding.** Arthur R. Butler. *Welding Engineer*, v. 30, April '45, pp. 50-52.
Reconversion will mean that new tools and dies will be needed in a hurry. Summarizes the fundamental principles of this specialized welding phase.

22-210. **Automatic Welding Booms.** *Welding Engineer*, v. 30, April '45, p. 56.
Ship booms—tapered, tubular structures formed of 1010 steel. Large numbers are needed, but volume production could not be achieved until automatic welding was applied to the longitudinal seams.

22-211. **Templet Tips.** *Oxy-Acetylene Tips*, v. 24, April '45, pp. 46-48.
Practical suggestions on making strip templets for cutting difficult shapes.

22-212. **Do You Follow Good Practices in Operating Your Acetylene Generators.** *Oxy-Acetylene Tips*, v. 24, April '45, pp. 49-51.
Good practices; cautions; changing shifts; freezing.

22-213. **A Carrying Case for Welding and Cutting Apparatus.** *Oxy-Acetylene Tips*, v. 24, April '45, pp. 57-58.
Protect valuable equipment and save time with a homemade sheet metal box.

22-214. **How to Recondition Cutting Nozzles and Welding Heads.** *Oxy-Acetylene Tips*, v. 24, April '45, pp. 58-64.
Step-by-step instructions for restoring damaged tips to serviceable condition.

23. INDUSTRIAL USES AND APPLICATIONS

23-86. **Wrought Aluminum Alloys for Aircraft.** Don A. Lawless. *Aluminum and Magnesium*, v. 1, Jan. '45, pp. 12-15.
Review of certain developments to date. Its main purpose is not necessarily to predict which of the new developments will eventually prove the most satisfactory for general use. Increasing the strength of 24S; "UT" temper. New alloys: modified dural type; zinc-magnesium type; free machining type. Aircraft engineering factors. 3 ref.

23-87. **Manganese Bronze Propellers.** *Foundry*, v. 73, April 45, pp. 108-109, 228, 230.
Manganese bronze for propellers conforms to the following specifications: Copper 58%; zinc 39%; iron, aluminum and manganese 1% each. This metal shows tensile strength 70,000 psi., and 35% elongation.

23-88. **Notes About Some Steel Cartridge Cases Made in Germany.** *Metal Progress*, v. 47, March '45, pp. 491-496.
German cartridge cases made of steel used by the enemy, and studied by American metallurgists. Composite cases for larger calibers; 50-mm. tank-gun ammunition; 20-mm. steel cases; one-piece cases for larger calibers.

23-89. **Effect of Cemented Carbides on Product Design.** Harry Crump and Paul Miller. *Product Engineering*, v. 16, April '45, pp. 217-221.
Presenting with examples the many possibilities in the use of cemented carbides for improving product design by increasing the life of parts. Physical properties and methods of attaching carbide parts to base materials are outlined.

23-90. **Design of Hydraulic Systems, IV.** Howard Field. *Product Engineering*, v. 16, April '45, pp. 265-269.
Selector and relief valves analyzed as to their design, characteristics, uses and construction. Valves classified as to type and sketches used to illustrate the design and operating features. Problems of materials used and internal leakage discussed in detail.

23-91. **Metals in Housing.** *Metal Industry*, v. 66, March 23, '45, pp. 183-185.
Value from the architect's and craftsman's standpoint.

23-92. **Use of Light Metals in Transportation.** C. D. Young. *Aluminum and Magnesium*, v. 1, March '45, pp. 17, 22-23, 26-27.
Future use of aluminum and magnesium in transportation equipment, as against ferrous metals, will be determined largely by the relative price positions of the two groups of metals and the development of the art in structural design as it involves the use of the alloys of steel, aluminum and magnesium. Reviews briefly the uses prior to the war. Table shows use of aluminum by highway, railway, and water transportation in 1939.

23-93. **Fiberglas Insulation for Wire and Cable.** Roy J. Black. *Wire and Wire Products*, v. 20, April '45, pp. 278-282.
Aid in production of Fiberglas covered wire.

23-94. **How Rail Failures Are Being Prevented.** R. E. Cramer. *Metal Progress*, v. 47, March '45, pp. 521-524.
Appraisal of the rail investigation at Urbana. Control-cooling has solved the major portion of rail failures which occurred during the first five years of their service. New types of failures such as shelly rail failures are still being investigated. It is believed that considerable change in rail properties will be necessary to avoid them.

23-95. **Detection and Prevention of Incipient Cracking in Firebox and Boiler Steel.** Ray McBrian. *Metal Progress*, v. 47, March '45, pp. 524-527.
Most prolific cause of trouble in locomotive boilers and fireboxes.

23-96. **Metal Limitations in the Perfection of Motive Power.** Paul L. Irwin. *Metal Progress*, v. 47, March '45, pp. 527-529.
Metal limitations in the perfection of motive power can be eliminated by: Striving to bring the quality of steel billets and plates up to prewar level or better; continuing the use of magnetic, radiographic, fatigue and electronic testing; improving the control of processing and of the actual heat treatment; utilizing any of the new metallurgical and process developments that will be sufficiently beneficial to the part under consideration.

23-97. **Improving the Railroad Axle.** O. J. Horger. *Metal Progress*, v. 47, March '45, pp. 529-532.
Axles and crank pins may be improved by proper shape but to obtain the maximum fatigue resistance, residual compressive stresses must also be present in the surface layers. Compressive stresses may be obtained by thermal means or by some form of cold work or rolling.

23-98. **The Railroad Car Journal Bearing.** John R. Jackson. *Metal Progress*, v. 47, March '45, pp. 532-534.
Journal bearings under cars in interchange service.

23-99. **Some Effects of the Trend Toward Rolling Stock of Lighter Weight.** Stephen H. Badgett. *Metal Progress*, v. 47, March '45, pp. 534-536.
Body design; relative costs; economics.

23-100. **Naval Construction.** H. F. James. *Metal Industry*, v. 66, March 16, '45, p. 162.
The possibilities for the increased use of light alloys.

24. DESIGN

24-34. **Production Processes and Methods, for Present and Postwar Uses.** *Product Engineering*, v. 16, April '45, pp. 249-264.
Review of various production processes, their inherent characteristics and features, and their influence and effect upon the design of products and machines. Casting, forming, assembly, and heating methods and surface treatment.

25. MISCELLANEOUS

25-37. **The Young Engineer in Foundry Production.** C. L. Heater. American Foundrymen's Association *Transactions* v. 52, June '45, pp. 1293-1299, 1305-1310.
Opportunities of the foundry industry; what the foundry industry has to offer young engineers; selection of men.

25-38. **The Place of the Engineer in the Foundry.** L. J. Fletcher. American Foundrymen's Association *Transactions*, v. 52, June '45, pp. 1300-1304.
Art, craft and science; science in agriculture; foundry training; foundry work classified; applied science in the foundry; development of the engineer in the foundry.

25-39. **Processing and Packaging.** Walter J. Brooking. *Steel*, v. 116, April 9, '45, pp. 133, 136, 156, 158-162.
Need for better protection from corrosive elements and effects of rough handling during war brings revolutionary changes in materials and procedures for preservation and preparation of parts to be shipped and stored. Packaging developments demonstrate that it is possible for parts so treated to retain full serviceability in nearly all parts of the world and under all conditions.

25-40. **The Coinage Metals in Antiquity, III.** Douglas Rennie Hudson. *Metallurgia*, v. 31, Feb. '45, pp. 201-206.
A critical review of metal extraction and craftsmanship since the third millennium B. C. under the heads: Asia Minor, Phoenicia; South Russia.

25-41. **High-Temperature Gas-Turbine Power Plants.** J. S. Haverstick and A. M. G. Moody. *Mechanical Engineering*, v. 67, April '45, pp. 229-233.
Air-cooling gas turbine blades; evaluating thermal efficiency; other improvements with cooling; assumptions made for calculations; specific heat values. 12 ref.

25-42. **Material-Handling Aids in Modern Production.** Carl H. Moeller. *Mechanical Engineering*, v. 67, April '45, pp. 235-237.
Industrial truck is playing an important role in war production because of its ready ability to pick up and haul heavy loads, to stack one load upon another, to operate in congested areas, to load and unload freight cars, etc., and all at minimum operating cost with a low initial investment when compared with the savings effected.

25-43. **Removing Broken Tools From Drilled Holes.** *Machinery*, v. 51, April '45, pp. 200-202.
Makes an electric arc butt-weld between a stainless-steel welding rod and the broken part and then extracts the broken part by tapping with a hammer on a lathe dog or clamp secured to the welding rod. Shows a variety of drills, reamers, and pilots removed by the method described.

25-44. **Bits and Pieces.** *Metal Progress*, v. 47, March '45, pp. 508-510, 627.
Quenching oils. Lead foil as base for next to last step in metallographic polishing. Mounts for fine wire and thin sheet. Why did it sprout? Brazing keys into shafting. Identification of nickel alloys by spot tests.

26. STATISTICS

26-77. **Canadian Steel Industry.** *Canadian Metals & Metallurgical Industries*, v. 8, March '45, pp. 38-39, 42.
Sound basis for the future maintained in wartime developments.

26-78. **Materials of Industry in Postwar Technology—Steel.** J. B. Austin. *Western Metals*, v. 3, March '45, p. 31.
Advantage will undoubtedly be taken of wartime metallurgical developments such as: Use of boron in steel to enhance hardenability; new knowledge, experience and steel compositions in connection with the use of steel at elevated temperatures; use of welding as a means of fabrication; continued use of some of the NE steels.

26-79. **British Steel.** Alexander Dunbar. *Iron and Steel*, v. 18, March '45, pp. 82-84.
Advocates the continuance of the system of private enterprise, subject to Government control, and points out the necessity of a sound organization of the industry and of its being prepared to place national efficiency before individual gain. The obligations of the industry, vis-a-vis the nation, the steel consumers, and the steelworks employees.

26-80. **Metal and Mineral Position of the United States and the Outlook for the Future.** Elmer W. Pehrson. *Metals*, v. 15, March '45, pp. 12-15.
Our country is neither "have-not" nation nor treasure-house of stored-up mineral wealth. Reserves compared with past production and with prewar consumption; mineral policy considerations.

26-81. **Magnesium and Postwar Small Business Prosperity.** *Die Casting*, v. 3, April '45, pp. 44-46, 56.
Postwar task; structural uses.

26-82. **The Future of the British Steel Industry.** Alexander Dunbar. *Metallurgia*, v. 31, Feb. '45, pp. 169-171.
Iron and steel industry is a basic industry upon which practically every other industry depends and it is one of the industries which will be expected to make the transitions from war to peace conditions in the least possible time. Reorganization and reconstruction plans must be given effect while endeavouring to maintain a high level of production. Future of such a vital industry is directly concerned with the economic future of Britain and all views which contribute to speeding the transition period are of great value. Brief survey of the steel industry.

(New Books on Page 16)

Stutzman Joins Midwest Research Institute

Milo J. Stutzman of the department of engineering research, University of Michigan, has joined the staff of the Midwest Research Institute, Kansas City, Mo. He has served on the faculties of the University of Pittsburgh, Iowa State College and Kansas State College and has been associated with a number of manufacturers in metallurgical research. Dr. Stutzman is a specialist in process metallurgy.

27. NEW BOOKS

27-52. **Dampfkesselschaden; ihre Ursachen, Verhutung und Nutzung fur die Weiterentwicklung.** Ernst Pfleiderer. 259 pp., illus. J. W. Edwards Co., Ann Arbor, Mich. $7.85.

27-53. **Elektrische Messung Mechanischer Grossen.** Paul Martin Pflier. Second ed. 259 pp., illus. J. W. Edwards Co., Ann Arbor, Mich. $6.50.

27-54. **Physik und Technik der Harte und Weiche.** Wilhelm Spath. 250 pp., illus., J. W. Edwards, Ann Arbor, Mich. $7.00.

27-55. **Transactions of American Society for Metals.** v. 34, 1945. Edited by Ray T. Bayless. 644 pp., illus., American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Twenty papers, with discussion, presented before the annual meeting of the Society in October 1944, plus the complete technical program, reports of officers, and the Campbell Memorial Lecture on "Some Fundamental Problems in the Manufacture of Steel by the Acid Open-Hearth Process" by G. R. Fitterer.

27-56. **Transactions of American Society for Metals.** v. 35, 1945, Edited by Ray T. Bayless. 638 pp., illus., American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Twenty-two papers, with discussion, presented before the annual meeting of the Society in October 1944. Also three additional papers: "A New Metallographic Etchant for Aluminum Bronze and Copper-Beryllium Alloys" by W. C. Coons and D. J. Blickwede; "A Relationship Between Hardenability and Tensile Strength of Normalized Steels" by Louis A. Carapella; "Diffusion in Powdered Metals" by P. W. Selwood and Jane Nash.

27-57. **Principio to Wheeling; 1715-1945.** Earl Chapin May. 335 pp., illus., Harper & Brothers, 49 East 33rd St., New York 16, N. Y. $3.00.

Story of Principio Furnace, Maryland and how it became today's Wheeling Steel Corp. Story of the family of George Washington as iron masters and their descendants who were pioneers in developing our modern iron and steel industry.

27-58. **Electrical Essentials in Marine Service.** John M. Dodds. 428 pp., diagrs. (Marine Electricians' Library, v. 1) McGraw-Hill Book Co., New York, N. Y. $3.00.

The first of a projected series of three volumes on the fundamentals and principles of marine electricity, this covers essential principles of electricity and magnetism and the characteristics of electric circuits.

27-59. **Introduction to Microwaves.** Simon Ramo. 148 pp., diagrs., McGraw-Hill Book Co., New York, N. Y. $1.75.

A non-mathematical description of the physical basis for microwave phenomena. An excellent treatment for persons with some knowledge of fundamentals of electricity.

27-60. **English-Russian Technical Dictionary.** 674 pp., International University Press, New York. $10.00.

27-61. **Aircraft Armament.** Louis Bruchiss. Edited by Glenn D. Angle. 224 pp., illus., diagrs., Aerosphere Inc., 370 Lexington Ave., New York 17, N. Y. $6.00.

For the layman and the expert, a review of the field of aircraft armament; bombs, machine guns, cannon, ammunition, turrets, foreign aircraft weapons, armor protection, anti-aircraft weapons, self-propelled ammunition and bombs, and future weapons.

27-62. **Shrinkage and Gas Effects in the Casting of Non-Ferrous Metals and Alloys.** W. A. Baker. British Non-Ferrous Metals Research Association Report R.R.A. 661, June '44, 44 pp. Price 7s 6d.

Elementary discussion of unsoundness arising from solidification shrinkage or from evolution of dissolved gas. Practical hints for gating to control the one and degasification to control the other. Regulated gas evolution may be desirable to distribute solidification shrinkage. Correlates data from many separate investigations, references to 58 of which are given. Written in simple, relatively non-technical language.—H. W. Gillett.

27-63. **Damping Capacity: A General Survey of Existing Information.** F. C. Thompson. British Non-Ferrous Metals Research Association. Report R.R.A. 657, August '44, 37 pp. Price 3s 6d.

Intelligent correlation of present knowledge from both the engineering and the theoretical points of view. Damping behavior is more sensitive to minor changes in metallurgical history of a specimen than any other measurable property. It cannot be predicted by any other test and conversely it cannot be used to predict anything else, such as fatigue behavior. Qualitatively a high damping capacity is useful to the engineer as a means of helping to avoid build-up of resonant stresses. Qualitative measurements are intriguing, but the author doesn't claim that they have much practical application. Avenues through which more useful data might perhaps be found are pointed out.—H. W. Gillett.

27-64. **Rockets, Jets and Dynamotors.** A. L. Murphy. 170 pp., illus., Wetzel, Los Angeles, Calif. $2.50.

27-65. **Carbon Dioxide.** Elton L. Quinn and Charles L. Jones. Second Printing, American Chemical Society Monograph No. 72. 294 pp., illus., Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. $7.50.

History, physical properties, chemical properties. Commercial manufacture of liquid and solid carbon dioxide. Uses of commercial carbon dioxide.

27-66. **Machine Drawing; a Text and Problem Book for Technical Students and Draftsmen.** Carl L. Svensen. Third edition, 280 pp., illus., D. Van Nostrand Co., New York. $2.50.

Advanced text including material on dimensioning, machine sketching and machine details; drawing of bearings, shafting and couplings, jigs and fixtures, gears and cams, and piping.

27-67. **Rockets and Jets.** Herbert S. Zim. 326 pp., illus., Harcourt, Brace and Co., New York. $3.00.

Non-technical account of development of rockets and jet-propelled devices. Principles of jet propulsion; experiments with high altitude rockets; goals and problems of interplanetary rockets.

27-68. **Stress Relief of Weldments for Machining Stability.** J. R. Stitt. 47 pp., illus., paper, Engineering Experiment Station Bulletin No. 121, Ohio State University, Columbus, Ohio. $.50.

27-69. **Careers in the Steel Industry.** Burr W. Leyson. 191 pp., illus., Dutton Publishing Co. $2.50.

Employment Service Bureau

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

Positions Open

METALLURGICAL ENGINEER: Required by eastern distributor of alloy steels for promotional and development work. Must have knowledge of stainless steel mill practice and stainless steel applications. Write stating education, experience, age, draft status, availability and salary expected. Replies strictly confidential. Box 5-5.

LABORATORY AND RESEARCH ASSISTANTS: Permanent positions in research laboratory of university metallurgical engineering department in Western Pennsylvania. Applicants must have some knowledge of metallography of steels and must be draft deferred. Can use anyone in range from high school education with one to two years' experience to recent Bachelor of Science in metallurgy. $150 to $200. Free tuition in night courses. Submit education, experience, references, photograph, and all details in first letter. Box 5-10.

INDUSTRIAL FURNACE SALES ENGINEER: Exclusive territory arrangement on straight commission basis for sales engineer familiar with industrial heat treating processes. Chicago territory now available. Old, well-established company. Box 5-15.

SPECTROGRAPHER: (Or chemist or physicist who would be interested in training in spectrography), for position of responsibility in a light metals plant with a sound future. Good starting salary commensurate with applicant's training and work record. Box 5-20.

PRINCIPAL
RESEARCH METALLURGIST
Requires wide experience in field of light metal alloys. Will be responsible for planning and direction of metals research programs.

Also needed are a RESEARCH METALLURGIST experienced in ferrous alloys connected with welding; and a SENIOR METALLOGRAPHER with a general background.

RESUMES MAY BE SENT TO
DIRECTOR OF ENGINEERING PERSONNEL
THE GLENN L. MARTIN CO.
BALTIMORE 3, MARYLAND

ASSISTANT MATERIAL ENGINEER: Metallurgical, engineering, or similar experience, to assist in preparation of specifications and technical bulletins. Good postwar prospects for the right man. Box 5-25.

ENGINEER: An excellent opening available for a man who has been trained or has had experience with industrial furnaces for heat treating. This position is permanent and offers a bright future for a good man. Stable business, with no reconversion problems. Salary and Bonus. Box 5-30.

SALES ENGINEER: With metallurgical and chemical experience to handle sales and service in New England for manufacturer of heat treating materials, chemical salts, and protective coatings. Well established and nationally known products. State qualifications and salary expected, draft status, etc. Permanent position. Box 5-35.

METALLURGISTS: With production, research or sales experience to act as territory field engineers. In replying state age, record and approximate salary requirements. The Titanium Alloy Mfg. Co., 111 Broadway, New York 6, N. Y.

GRADUATE METALLURGIST: At least 5 years' experience in electric melting of high speed, tool steel in general, stainless, etc., for supervising melting. Give all information including draft status, availability. Box 4-70.

ASSISTANT METALLURGIST: Or skilled laboratory technician having the following qualifications: Ability to prepare steel specimens for microscopic examination; to identify commoner steel microstructures (metallography); to supervise research work projects; to supervise laboratory personnel. Excellent present and postwar future. Employer engaged in the manufacture of precision springs and parts requiring specialized heat treatment. Certificate of availability is necessary. Box 5-85.

MECHANIC OR TOOL ENGINEER: Thoroughly familiar with tool setups and machining stainless, alloy, carbon steels. Required for customer contact work by steel distributor covering eastern states. Write stating age, education, experience, draft status, availability and salary expected. Replies strictly confidential. Box 5-90.

METALLURGISTS: At least one year's experience in ferrous or non-ferrous metallography. Experience in failure analysis of engine parts would be particularly helpful. Good postwar prospects in present essential industry located in middle west. Box 5-95.

CARBIDE TECHNICIAN: Well-known eastern company with established sales outlet has excellent opportunity for chief technician to develop carbide line, especially for wear resistant applications. Fundamental processing equipment installed. Company also interested in cast tool development, precision and centrifugal castings, with particular reference to special heat resisting applications, such as gas turbines. State age, education, experience, salary desired and draft status. Box 5-100.

METALLURGICAL ENGINEER: Laboratory work in product and process development requiring college training in metallurgy or engineering. Involves research work in varied fields, principally ferrous. Of a long-term nature with a salary commensurate with permanent peace time products. Box 5-125.

PRODUCTION ENGINEER: To supervise operations and personnel in a midwestern plant employing 125 persons. Box 5-130.

Positions Wanted

METALLURGICAL ENGINEER: Graduate with 8 years' experience in ferrous and non-ferrous research and production laboratories. Excellent background in all phases of control, failure analysis and trouble shooting. Familiar with new alloys and treatments. Desires permanent position with mid-west organization as research or control metallurgist. Box 5-40.

DEVELOPMENT CHEMICAL ENGINEER: Desires position with manufacturer or fabricator. Graduate and State Registered Professional Chemical Engineer. Experience in equipment design, pilot plant operation, mass production supervision, process and export rustproofing, furnace fixture brazing, silver alloy development, heat treating and processing cost saving. Box 5-45.

PHYSICAL METALLURGIST: 42, D. Sc., with nine years of diversified industrial experience and six years university experience. Patents and publications. Experience includes research, development, supervision of and planning for metallurgical laboratory. Desires connection in supervisory capacity with university or research organization with postwar assurance. Box 5-50.

METALLURGICAL ENGINEER: Experienced in physical metallurgy; metallography; laboratory supervision; ferrous and non-ferrous metals and alloys; heat treatment of carbon, alloy and tool steels; mass production methods of fabrication and processing; industrial research and development; desires position with aggressive organization. Age 32; draft classification 2-B. Release from present employer obtainable. Box 5-55.

PHYSICAL METALLURGIST: Electrochemist. Control heat treating department, plain and alloy steels, aluminum alloys; metallurgical, metallographic and chemical laboratory; metal finishes; some experience in brass and zinc coated wire, dies, precision centrifugal steel castings, austempering; knowledge of selenium rectifier production. Reads several European languages, executive experience, above draft age. Box 5-60.

METALLURGICAL ENGINEER: B.S. and M.S. in Met. Eng., Columbia University; age 29; single. Three years' experience in ferrous metallurgy—production control, development, research and metallography; one year in non-ferrous metallography. Recently retired naval officer with rank of lieutenant; 3½ years in Navy aeronautics, supervisory work. Now living Pittsburgh area. Available summer of 1945; minimum salary $300. Box 5-65.

MANAGER-METALLURGIST: Excellent technical background and wide industrial heat treating experience. Available for position with postwar stability. Well qualified to plan, install, operate, and manage plant doing all varieties of general and special heat treating. Familiar with latest heat treating methods and equipment. Can produce results. Box 5-70.

METALLURGIST: Wide experience as consultant in process and quality control. Thoroughly familiar with steels, heat treating equipment, and heat treating methods. Excellent education. Exceptionally well qualified to carry on practical research program or give technical assistance to sales force of a company handling heat treating equipment, steel, forgings, castings, or related materials. Box 5-75.

PLANT FOREMAN: Ambitious young man would like supervisory position in a heat treating or similar plant. Good references; excellent background. Experienced in high frequency induction bardening and new salt bath methods. Steady and reliable. Draft exempt. Free to move. Box 5-80.

PHYSICAL METALLURGIST AND CHEMIST: Control of heat treat department (carbon, alloy, stainless and tool steels), spectroscopic and metallographic laboratory. Two years as works metallurgist; experience in gray iron, malleable, brass and aluminum foundries. Married, age 38, draft status 2-B. Location desired in south or southwestern part of U. S. Box 5-105.

PROCESS AND DEVELOPMENT ENGINEER: Age 29 yrs. Six years' diversified experience in aluminum industry. Intimate knowledge of metallurgical and production practices employed in melting, fabricating and reclamation of aluminum alloys. Desires administrative position in production, research or sales in conservative organization having postwar possibilities. Box 5-110.

HEAT TREATER: 15 years' experience specializing in high speed steel, various types of tool steel and spring steel. Wide experience in carburizing and forgings. Age 35; ambitious and willing worker possessing initiative. Box 5-115.

METALLURGIST: Graduate; 10 years' steel mill experience, specializing in development, research, investigation of customer complaints, heat treatment and annealing of carbon and alloy steels and customer contact work. Desires position as chief metallurgist, assistant or development metallurgist with company having definite postwar future. Box 5-120.

GRADUATE METALLURGICAL ENGINEER: Age 36; married. 12 years' experience in all phases of fabrication and heat treatment of ferrous metals; particularly alloy steels. Production control, development work, and customer contacts. Desires responsible, permanent postwar assurance. Salary $7,500; location immaterial. Box 5-140.

GRADUATE METALLURGICAL ENGINEER: 25 years diversified supervisory experience in all branches of ferrous and non-ferrous founding, in research and development of metals, in production heat treatment of tool and die steels and steel castings, and in precision casting. Will plan equipment and layout and take charge of all manufacturing operations (wax, plastic, ceramics and melting) for production of precision castings. Box 5-145.

For Sale

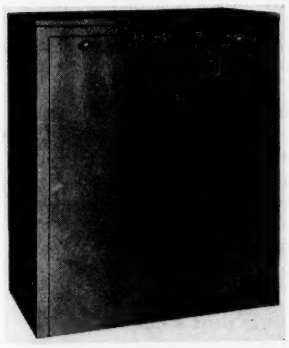
RECONDITIONED USED INVERTED TYPE METALLOGRAPHIC MICROSCOPE, WITH CAMERA AND STAND. Box 5-1.

NEW PRODUCTS IN REVIEW

TEMPERATURE CONTROL OF MACHINE TOOL COOLANTS

Airtemp Division, Chrysler Corp., Dayton, Ohio.

One of the outstanding developments brought about by the demand for maximum production and increased efficiency from machine tools is the perfection of a system for controlling the temperature of coolants and cutting oils. By application of uniform temperature control marked results have been shown on many machines.



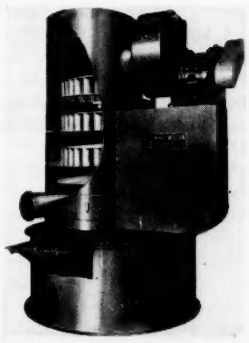
Chrysler's "packaged" cooling units control the variables caused by coolants and cutting oils which exist in so many production lines. Now it is possible to produce a uniform temperature condition, so essential in producing maximum results. This condition, once established, can be maintained throughout the year. Airtemp cooling units remove a constant volume of heat equal to that being generated, thus removing heat rapidly enough from the point of cut. On the basis of studies made of many tool operations, it has been found that maximum flexibility of operation can be obtained by installing "packaged" cooling in connection with each machine tool. In addition to being compact and self-contained, the system is automatic and simple to operate. Its design lends itself to rearrangement of production lines, and is adjustable to suit the individual machine. A 16-page booklet is available to describe the operation of this equipment in detail.

Mention R922 When Writing or Using Reader Service.

SELF-CONTAINED DUST COLLECTOR

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

This self-contained dust-collecting unit has been developed to handle isolated dust-creating operations which cannot conveniently be served by a central dust collecting system.



The Type "EC" multi-wash collector combines in a single compact, portable self-contained unit all the functions of the larger dust and fume control system. The equipment consists of a 3½ impingement stage multi-wash dust collector, a suction fan, a sludge settling tank, a recirculating pump, and an after-filter. The unit operates with the same high efficiency as larger multi-wash equipments and is available in capacities of from 400 to 5000 cu. ft. of air per min.

The collector is designed to function indefinitely with but little attention and with a very minimum of maintenance. There are no bags, screens or filters to require cleaning or replacement. The collected matter, as sludge, is disposed of more easily than an accumulation of dust. Bulletin No. 145 gives a comprehensive description of this collector.

Mention R923 When Writing or Using Reader Service.

SOLID BIT CUTTING TOOL

Crobalt, Inc., 1360 North Main St., Ann Arbor, Mich.

This new solid cast steel cutting tool is produced by melting a special cobalt steel alloy in an indirect arc rocking electric furnace, superheating to well above 3000° F., and casting in molds of the approximate tool size. This process is said to give the metal a preferred grain and carbide particle size at the time of casting, thus doing away with the need of forging and later heat treating.

This process results in a tool that will retain its cutting ability on many types of work several times longer than has heretofore been considered possible, according to Charles Baird, vice-president in charge of development and production for Crobalt. Cutting speeds can safely be increased by 20%.

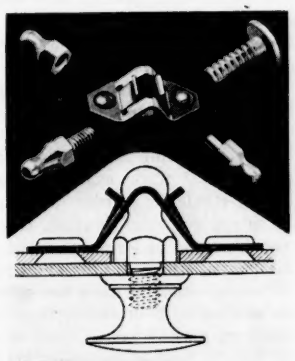
These "Powersteel" solid tool bits are supplied hardened and ground, ready for use. They can be resharpened and used as long as the tool can be held in the holder. They require no change in present equipment or shop practice. Descriptive bulletin with prices will be sent upon request.

Mention R924 When Writing or Using Reader Service.

NEW SPEED NUT LATCH

Tinnerman Products, Inc.,
2066 Fulton Rd., Cleveland 13, Ohio

This new spring steel speed nut latch No. 1663 has been developed for instant attachment and removal of box covers, access doors, panels and inspection plates. The spring arms of the speed nut snap over ball or grooved studs to provide firm attachment, yet studs may be quickly withdrawn. The speed nut is available in five material thicknesses to provide the desired degree of pull-out tension. Three styles of ball studs are available, drilled and tapped for 6-32 screws, threaded shank (6-32 thread) and plain shank for riveting.



These, as well as the grooved stud, are provided in various lengths to suit application requirements. In writing for samples, please specify (a) pull-out tension required (3½, 8, 12, 18, or 30 lb.); (b) thickness of panel to which speed nut will be attached; (c) type of stud, and (d) length of plain or threaded shank, or length of grooved stud.

Mention R925 When Writing or Using Reader Service.

INDAR METALS

Indar Corp., 330 Lemcke Bldg., Indianapolis 4, Ind.

This corporation offers a new kind of metallurgical service supplying a complete line of all available metals for scientific, experimental or production purposes. Indar metals can be supplied in wrought, powder or lump form. Service is combined with metallurgical assistance in problems connected with applications of Indar metals.

In addition to Indar metals and Indar alloys, special chemicals will be handled which are used in connection with metallurgical processes and reactions.

Mention R926 When Writing or Using Reader Service.

MAGNESIUM STRIP COILS

Burgess Battery Co., Department M-20, Freeport, Ill.

Magnesium strip coils can be supplied in widths from ¾ to 5 in. and in gages from 0.010 to as thin as 0.005 in. by this company. The development is an outgrowth of a need which originated with the Burgess Battery Co. in one of their manufacturing projects for the armed forces. Since magnesium was not available in coiled strip form as thin as necessary, Burgess engineers developed a process with their rolling mill facilities to produce a coiled strip for their own need.

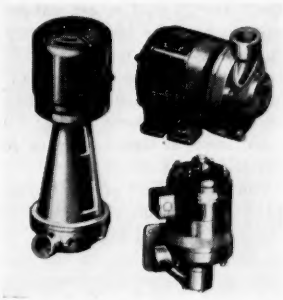
This development proved successful, and Burgess thin strip magnesium has been made available to other users in coil form. It offers manufacturers a distinct advantage in fabrication by enabling mass production in strip fit form over individual sheet feeding. Technical data and sample strips are available upon request.

Mention R927 When Writing or Using Reader Service.

CENTRIFUGAL PUMPS

Gray-Mills Co., Evanston, Ill.

A new line of Superflo centrifugal pumps has been announced by this company. Higher volume delivery per horsepower and ease of maintenance are features. The heavy duty motors are mounted integrally to the pumps for compactness, strength, and to provide a streamlined design.



Pump motors range in various sizes — 1/25, ⅛, ¼, and ½ h.p., with volumes of 9 to 75 G.P.H. Thirteen basic models are available with various voltage characteristics. There are types for horizontal-external mounting, for vertical-external mounting, and other pumps with floating impellers are made for submerging in the coolant system reservoir. The latter may be used for fluids having abrasive content. Grease-sealed motor bearings and mechanical seals of the pumps require no lubrication.

Mention R928 When Writing or Using Reader Service.

BLAST NOZZLE

American Foundry Equipment Co.,
555 S. Byrkit St., Mishawaka, Ind.

Adding to its present line of Long-Lyfe blast nozzles, this company is now in a position to supply a complete line of nozzles using Norbide borium carbide inserts—the hardest material made. Added feature to long service life is the jacketing of this insert in an abrasion-resistant alloy steel. The new nozzle is guaranteed for 1500 hr. of service when used with steel shot or grit and for 750 hr. when used with silica sand. Improved blasting efficiency, decreased air consumption, and low hourly costs are among the advantages claimed by the manufacturer.

Mention R929 When Writing or Using Reader Service.

READER SERVICE COUPON

CHECK THESE NUMBERS FOR PRODUCTION INFORMATION AND MANUFACTURERS' CATALOGS

Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

Check as you read—note the number immediately below the item of interest—mark this coupon and mail for prompt handling.

R901	R910	R919	R928	R936	R944
R902	R911	R920	R929	R937	R945
R903	R912	R921	R930	R938	R946
R904	R913	R922	R931	R939	R947
R905	R914	R923	R932	R940	R948
R906	R915	R924	R933	R941	R949
R907	R916	R925	R934	R942	R950
R908	R917	R926	R935	R943	R951
R909	R918	R927			

SAVE TIME—GET COMPLETE INFORMATION—CHECK THESE NUMBERS FOR ACTION

YOUR NAME _____

COMPANY _____ TITLE _____

STREET _____ CITY AND ZONE _____

MAIL TO THE METALS REVIEW, 7301 EUCLID AVE., CLEVELAND 3, OHIO

Gensamer Tells Effect Of Microstructure on Properties of Steels

Reported by W. W. Dyrkacz
Metallurgical Engineer, General Electric Co.

The effect of aggregate microstructures on mechanical properties was the first of four main subdivisions of a lecture on "Relationship Between Microstructure and the Properties of Steel" presented before the Eastern New York Chapter on March 13 by Maxwell Gensamer, professor and member of the staff of the Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh.

Tensile strength and hardness, Dr. Gensamer showed, depend upon the mean path from one carbide particle to another, while the ductility is a function of the mode of distribution of the particles within the steel. The rate of strain hardening is practically independent of the tensile strength value, as shown by true stress-strain curves for three different eutectoid steels, although the ductility varies. The resistance to deformation of an 0.80% carbon steel having a pearlitic structure and one having a spheroidized structure is the same, as long as the log mean path through the ferrite is the same.

The second part of Dr. Gensamer's lecture was devoted to the peculiar effects of minute amounts of elements on physical properties. The work of J. R. Low, Jr. and the speaker on the elimination of the yield point in mild steel sheet was described. By wet hydrogen treating at 725°C. it was possible to eliminate the yield point entirely, and still retain a grain size of 7 to 8. The tensile strength and elongation were affected very little, but the yield strength was decreased to approximately 13,000 psi.

The elimination of the yield point was attributed to removal of carbon and nitrogen, since the oxygen content was practically constant. Dr. Gensamer stated that the yield point can be put back into the steel in a very short time by re-introduction of nitrogen or carbon in amounts as small as 0.002%.

Dr. Gensamer then turned to the effect of various amounts of ferrite in pearlitic and tempered-martensitic steels. The pearlitic steels are uniformly lower in notch impact strength than the martensitic steels. It was shown that pearlitic background steels treated to the same hardness and varying in ferrite content from 6 to 17% show practically no variation in notch impact strength (19 to 21.6 ft-lb.). However, martensitic background steels treated to the same hardness, but varying in ferrite content, show a great variation, with a 0.5% ferrite content resulting in a notch impact strength of 82.3 ft-lb., and a 9% ferrite content showing 49 ft-lb.

Dr. Gensamer concluded that pearlite is characterized by low notch impact strength, and that ferrite, by itself, does not lower notch impact strength. In the martensitic steels, ferrite is a sensitive indicator of the presence of pearlite, the latter being the cause of low notch impact strength.

The talk was closed with a discussion of the effect of alloying elements in solid solutions. The rate of strain hardening changes with the hardening due to solid solution alloying. True stress-strain curves for about ten different elements showed that there is a progressive increase in tensile strength with increase in concentration of alloying elements, and that the curves belong to the same family. Therefore, the solid solution alloying effects are additive, and hence it should be possible to calculate the strength of ternary, quaternary, and higher alloys in terms of one of the alloying elements.

Precision Casting Called a Wartime Development of Major Importance

Reported by John L. Petz
International Business Machines Corp.

"Precision Castings" was the topic discussed at the regular March meeting of the Rochester Chapter of A.S.M. when Ray Wilcox, chief metallurgist of the Michigan Steel Casting Co., Detroit, ably substituted for J. D. Corfield, vice-president of the company, who was unable to be present because of illness. He was assisted by A. Homberger and M. Gorham.

Precision casting is a wartime development of major importance, and the method of producing precision castings was explained in detail by these gentlemen. The meeting attendance was one of the largest of the season.

Previous to the technical talk Robert Rodabaugh, instructor at the University of Rochester, was called upon by Chairman Ed Shaw to arise and accept his congratulations and those of the Chapter for obtaining his Ph.D. from Purdue University.

Special Properties Are Base Of Many Plastics Applications

Reported by C. A. Nagler
Instructor of Metallography, University of Minnesota

"Plastics is a new kind of stuff they are going to make things out of after the war." This statement, read from an advertisement, illustrates the layman's interpretation of plastics and sums up much of the advertising in popular magazines, R. W. Auxier, plastics engineer of Westinghouse Research Laboratories, told the North West Chapter at its March meeting.

A plastic in the commonly accepted sense is a synthetic organic material made in either of two ways: (1) By making large molecules from small molecules, or (2) by altering large organic molecules that occur in nature. Common examples are changing ethylene to poly-ethylene, styrene to polystyrene and vinyl chloride to polyvinyl chloride. One of the most readily available types of large molecules occurring in nature is cellulose, which is altered by synthesis.

Themoplastic materials are softened with heat and are worked with pressure; they are re-usable. Thermosetting plastics are softened with heat and pressure but have a limited life under heat.

Many of the thermoplastics are used for properties other than tensile strength; namely, Lucite for its fine optical properties, polystyrene for its good electrical properties. One drawback of thermoplastics is their low softening temperature (70 to 80°C.). Mechanically they are not too strong a material. Many of the selections of plastics are made on the basis of chemical, optical or other properties rather than strength.

The thermosetting plastics are filled with materials which contribute to their ultimate physical properties. They are classed as either molding compounds or laminates. Molding compounds are materials with limited mechanical properties but unlimited shapes. Fillers for thermosetting plastics may be asbestos fiber, chopped cloth, granular materials, glass wool.

Laminates are concerned with the form in which the filler is added to the plastic. Laminated thermosetting plastics have far superior properties to thermoplastics on the basis of tensile strength, impact strength and compressive strength.

Industrial Furnaces Reviewed, Modern Improvements Shown

Reported by J. B. Segada
Metallurgist, Youngstown Sheet and Tube Co.

The development of industrial furnaces was reviewed by W. O. Owen, Chicago regional manager, Industrial Division, Surface Combustion Corp., in a talk before the Calumet Chapter of the A.S.M. on March 13. He pointed out that many improvements have been brought about by the introduction of metallurgical inspection, changes in the fuel situation, and fuel practice.

Designating the soaking pit as one of the most basic furnaces in the steel industry, Mr. Owen pointed out that the introduction of the one-way soaking pit in 1926 was the first radical departure from the regenerative type of pit.

Slab heating furnaces have progressed through many stages along with the development of the modern strip mill, requiring a uniformly heated slab end to end and front to back, and a controlled type of scale coating.

In annealing, the old style box furnace and tunnel kiln have largely given way to the radiant tube type of annealing cover and a modernized version of the old in-and-out batch-type furnace. Advancements in steel treating by the addition of atmospheres and atmosphere furnaces were discussed.

Recent developments such as skin recovery—the restoration of the original carbon to decarburized steels—were discussed. Continuous pickling by means of atmosphere rather than an acid was briefly described. Various types of atmosphere machines such as DX, RX, and NX were described and their range of applications discussed.

In a coffee talk, Lt. David Schloss, U. S. Air Force, who received a presidential citation, gave a thrilling account of his experiences in the European war theater.

Stainless Steel Uses in Aircraft

(*Continued from page* 1)

explained the action of each element individually and showed numerous graphs indicating what can be attained in these steels insofar as mechanical properties are concerned. He also showed that regulations in the analysis are in order if we are to produce steels with the lowest rate of work hardening, or in other words, steels best suited to certain forming processes.

Closer Contact Advocated Between Vendor and Purchaser of Aluminum

Reported by G. H. Taylor
Chief Inspector, La Plant-Choate Mfg. Co., Inc.

Speaking on "Aluminum and Its General Uses" before the meeting of the Cedar Rapids Chapter on March 13, Ralph B. Akins, general superintendent of the Blackhawk Foundry and Machine Co., outlined the early history of the aluminum industry and described some of the many contributions of aluminum in furthering the war effort.

Mr. Akins advocated closer contact and cooperation between the purchaser's engineering and metallurgical staff and that of the vendor when aluminum castings are being purchased, citing cases where as much as 40% savings in cost were made when both parties understood the other's problems.

The meeting concluded by showing the Aluminum Co. of America's technicolor sound film "Unfinished Rainbows." After the meeting, an exhibit of over 100 uses of aluminum and its alloys was examined with great interest by those present.

Tests Prove Value of Shot Peening In Raising Fatigue Resistance

Reported by E. M. Evans
MacDonald Bros. Aircraft Limited

Many interesting problems in connection with the metallurgy of aircraft engine materials were described by Herbert J. Noble, chief metallurgist, Jacobs Aircraft Engine Co., Pottstown, Pa., before the Manitoba Chapter on Feb. 8.

Mr. Noble also described in detail a series of experiments, conducted by himself, on the improvement of fatigue resistance by shot peening. Some of the tests were conducted on a Stanton repeating impact machine. Other tests involved a rotating beam specimen of unusual design, and were made to evaluate variations in surface finish, shot peening, and slight variations in furnace atmosphere while heat treating.

Seasholtz Talks on Interrupted Quench

Reported by W. T. Rubin
Metallurgist, Copperweld Steel Co.

A knowledge of the "S" curve is essential for the isothermal treatment of steels, the members of the Warren Chapter were told on March 8 by A. P. Seasholtz, metallurgical engineer for E. F. Houghton & Co., whose topic for the evening was "Interrupted Quenching in Salt Baths." The interrupted quench is not new, but has regained prominence within the last few years because of the increased need for heat treating steel without distortion and cracking.

Detailed reports of Mr. Seasholtz's talk have been published in previous issues in reports of other chapter meetings he has addressed.

Tells Use of TTT Curves for Annealing Cycles

Reported by H. P. Henderson
Production Engineer, New Departure Division G.M.C.

An interesting talk was given by Peter Payson on "The Annealing of Steel" at the March meeting of the Hartford Chapter. Mr. Payson is assistant director of research for the Crucible Steel Co. of America. His talk, which dealt with the use of transformation-temperature-time curves for steel to determine cycles permitting shortest annealing periods, has been reported in previous issues.

Savings by Triplexing Shown In Reagan's Talk on Electric Steel

(*Continued from page* 1)

The blown metal is obtained from four separate blows of 25,000 lb. each and by obtaining rapid analysis on this metal it is possible for the blower to regulate the latter blows so that any desired carbon can be produced within satisfactory limits. The practice is to have the molten metal charge in the electric furnace average 25 to 30 points of carbon above the desired finishing value.

In this practice the time in the electric furnace from tap to tap is only about 2 hr., which gives a tremendous saving in power costs and increased tonnage per furnace.

In the remainder of his talk Mr. Reagan emphasized the large variety and number of tests that are taken on all metal on the pouring platform and during the further processing of the steel. He also showed several slides indicating the similarities between open-hearth and electric furnace practice.

In his coffee talk Bernhard Ragner related his personal experience in France and read letters from French hostages to support the thesis that the Germans were unable to stamp out the spirit of the French people during the occupation period.

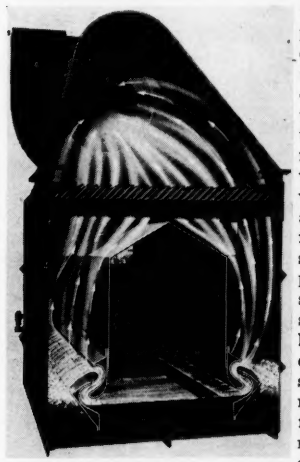
NEW PRODUCTS IN REVIEW

MAGNESIUM DUST COLLECTION

American Air Filter Co., Inc.
First and Central Ave., Louisville 8, Ky.

War production increased the demand for control of dust and called for a system of collecting these dusts that would (1) eliminate the fire hazard, (2) contain no moving parts to be fouled by dusts with adhesive properties and (3) be easy to install and require a minimum amount of space. This company has helped to solve the problem with the introduction of a simple efficient dust collector based on the principle of hydrostatic precipitation.

The air is cleaned by a combination of centrifugal force and intimate inter-mixing of water and dust laden air using an inverted water curtain which produces such a thorough wetting effect that high collection efficiencies are obtained even with those dusts that are normally considered water repellent. This water curtain is created by the induced flow of air through a specially designed impeller which forms a sinuous passage resembling a reversed letter "S." The lower opening of the passage is partially submerged and the air flowing at approximately 4,000 f.p.m. carries the water with it in a heavy turbulent sheet along the inner surface of the lower blade at such speed that it is projected across the passage and reverses direction to follow the curve of the upper blade from which it is ejected as a dense curtain which blankets the clean air chamber. The dust laden air passes twice through this curtain of water but even more important is the continuous contact of the air and water as they travel upward through the sinuous passage. All of this is accomplished without the use of pumps, spray nozzles or auxiliary equipment.



This new collector was especially designed to overcome the hazards connected with the working of magnesium. By precipitating the collected magnesium dust under water, it conforms to one of the proven safe methods of storing this material. With smooth interior surfaces, there is no chance for the wetted magnesium particles to become deposited on ledges or recesses within the collector. While damp magnesium dust does burn with greater violence than when dry, the condition in the collector is carried to the opposite extreme and the collected dust is stored in a "flooded state" under water. Where the percentage of water exceeds approximately 50%, magnesium dust cannot be ignited.

Of special significance is the fact that no magnesium particles can pass into the drain from the collector since any overflow consists only of excess make-up water. In operation, the liquid level is raised in the clean air chamber and lowered in the dirty air chamber; the difference in levels being equal to the resistance of the collector. The correct operating level on the lower impeller blade is maintained by an overflow weir which is mounted in a control chamber on the side of the collector housing.

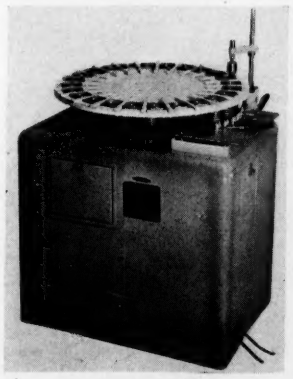
There are small industrial units which can be located directly in back of a magnesium grinding stand. The inlets are located so that exhaust ducts run directly into the collector which is an important safety feature. Bench types have been developed for burring, filing and flexible shaft grinding.

Mention R930 When Writing or Using Reader Service.

INDUCTION EQUIPMENT FOR BRAZING

Scientific Electric Div., "S" Corrugated Quenched Gap Co.
107-119 Monroe St., Garfield, N. J.

This is a new 24-station circular indexing carrier mounted on one of the company's 18-kw. electronic high frequency generators to braze metal assemblies. A complete assembly is ejected from the carrier each 12 sec. The operator's activities are limited to loading the stations as they come around empty. Heat is applied by a set of three water-cooled induction coils located under three of the work positions. The coils are followed by the vertically operated ejecting mechanism. Carrier drive is by a small motor.



Mention R931 When Writing or Using Reader Service.

PORTABLE PYROMETER

K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago, Ill.

This new portable pyrometer weighs only 1¾ lb. It is particularly adapted to reading the temperature of molten metals (exclusive of ferrous metals), hot air or liquids and for hot surfaces, if used with the prod type thermocouple.

Revolutionary body design elevates the scale to an angle that offers maximum reading ease in all working positions and minimizes side reflections on the scale glass. This unusual shape further lessens the danger of scale glass coming in contact with other objects when the instrument is placed in any resting position, therefore reducing glass breakage.

Instrument movement is of high quality, providing accuracy of reading to 2% of scale range. Duo scale is standard with readings of 0 to 500° F. and 0 to 1000° F.; 0 to 750 and 0 to 1500° F.; or 0 to 1000 and 0 to 2000° F. or equivalent Centigrade. Other scales are available on special request.

Mention R932 When Writing or Using Reader Service.

HARD-FACING METAL

Fansteel Metallurgical Corp., North Chicago, Ill.

A new non-ferrous hard-facing metal is intended for acetylene torch application to steel and possesses marked resistance to abrasion, heat, impact and erosion.

Known as "Fanweld", this metal contains tantalum-columbium carbide which imparts a peculiar self-lubricating action, minimizing the destructive effects of friction even at elevated temperatures. Extensive tests indicate that "Fanweld" is unusually well suited for hot work punches, dies and tools.

Properly applied, it "wets" steel surfaces readily without the use of flux, flowing smoothly and evenly. Surfaces as thin as 0.010 in. can be applied with a fusion layer as thin as 0.0005 in. No hardening or heat treating operations are necessary. "Fanweld" is made in 3/16-in. and ¼-in. diameter rods in 14-in. lengths. Detailed information and prices are given in a new booklet.

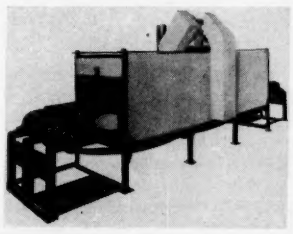
Mention R933 When Writing or Using Reader Service.

DOUBLE BELT CONVEYOR OVEN

Gehnrich Oven Division, W. S. Rockwell Co.
50 Church St., New York 7, N. Y.

This new continuous heat processing oven offers many combinations of drying, baking or heat treating operations with effective uniform heating and savings in handling, labor, time and plant space.

Designed specifically for preheating and baking electronic devices, i.e., zinc die castings assembled with the necessary paper, copper, plastic discs and vacuum tubes, this oven presents, nevertheless, by the very nature of its handling and heating, possibilities for applications in many other fields.



The oven housing is built of Gehnrich patented insulated dual panel assembly with no through metal or metal joints, minimizing heat losses. Electric heating elements are mounted in the oven just below the roof, and a large motor-driven multi-blade fan is mounted on the roof. Heat from the elements is drawn through the fan into a vertical duct to the bottom of the oven and distributed evenly by means of louvres in the oven floor upward through the work moving on the conveyor belts and up past the electric heaters. If gas or steam heating is desired, the heater and fan unit can be set on the roof with the same means for heat distribution and recirculation.

Each wire-mesh belt conveyor, running between angle guides, is provided with a speed reducer, roller chain and a variable speed pulley drive. One drive mechanism (not shown) is mounted on the bottom base at each end of the oven. This permits operation of the conveyors at any desired speed in the same or opposite directions. For example, in the specific case for which the oven was built, the conveyor speed through the preheat section was three times that of the conveyor through the baking section. Thus individual pieces of work set directly on the belt, or baskets or trays of bulk materials, can be fed simultaneously from both ends of the oven, or in two rows from one end, as desired.

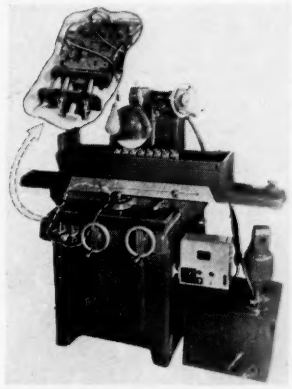
While the overall size of this oven is only 15 ft. long x 3 ft. wide, the design is flexible enough to permit any required dimensions and variations of construction details to meet specific production, time and temperature cycles. Suitable ventilation for purging the oven of volatiles, and inter-locked automatic protective controls of temperature, heat source and fan assure positive operating safety and uniform processing.

Mention R934 When Writing or Using Reader Service.

NEW HYDRAULIC VALVE ON DOALL G-10 GRINDER

Continental Machines, Inc.
1301 Washington Ave., South, Minneapolis 4, Minn.

A new "five-in-one" hydraulic control valve has been incorporated in the DoAll G-10 surface grinder to provide increased speed, efficiency, simplicity of operation and greater accuracy. This new machine tool will grind a surface to 6 micro-inches.



The G-10 DoAll has a variable table travel of 0 to 50 ft. per min. with a cushioned reversing action operated by the pilot valve to give smooth, long life performance. To accomplish this, two valves are necessary—a table control valve and a table reversing valve.

The crossfeed action (indexing at the end of the table travel) is actuated by a hydraulic cylinder and can be controlled in infinite settings from 0.004 to 0.200 depending on the work being done. The crossfeed or traverse action in addition to hydraulic operation is also actuated by an accurate screw located in the center of the cross travel ways and can be held to split tenths of a thousandth for close tolerances on form and tool grinding with manual operation.

When the automatic crossfeed is used for sharpening dies or any flat grinding to size, the crossfeed screw or manual drive is disengaged by a hydraulic cylinder; thus the accuracy of the crossfeed screw for form grinding will last over a longer period of time. To obtain the required motions, three components are necessary: (1) Selector valve; (2) crossfeed control; (3) crossfeed directional valve.

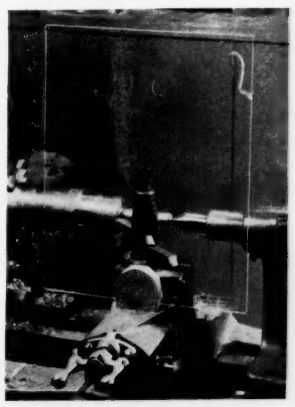
It is well to remember that a surface grinder is a finishing machine. All of the accuracies employed in previous machining operations are completely lost if the finishing machine does not perform accurately. A surface grinder requires the operator's attention on the work piece. Simplified positive acting controls allow him to keep his eye and his mind on his work without thinking of complicated machine controls.

Mention R935 When Writing or Using Reader Service.

SAFETY DEVICE FOR MACHINE TOOLS

Dilley Manufacturing Co.,
10127 Euclid Ave., Cleveland 6, Ohio

This safety device eliminates the need of goggles and face shields in many machine tool operations. Known as the Magnetic Grip-Shield, it consists of thick transparent sheets of plastic anchored into a horseshoe permanent magnet.



Made in various sizes, it may be instantly positioned without tools. The magnet in the base of the shield holds it in position, yet with a slight twist, it may be moved to suit operating conditions. It deflects flying chips, metal dust, sparks, oil and liquids to protect machine operators without obstructing vision. Sizes range from 3x4 to 8x10 in. and the device also is available in hood type for long-time operations.

Mention R936 When Writing or Using Reader Service.

COPPER BRAZING

Salkover Metal Processing Co.
4209 W. Lake St., Chicago, Ill.

Entrance of this company into the field of design and method consultation as related exclusively to electric furnace copper brazing, is announced by Lawrence Jacobsmeyer, manager of the Chicago plant. It is believed that the long and varied experience enjoyed by this company should prove helpful to many manufacturers who wish to investigate the quality improvements and cost reductions which usually follow the adoption of this fabrication method.

This new design and method consultation is intended chiefly to assist companies located so far from the Salkover plants that shipment is impracticable. Although there are Salkover commercial electric brazing plants in Long Island City as well as Chicago, for the time being this service will be available only from the latter plant.

Mention R937 When Writing or Using Reader Service.

MANUFACTURERS' CATALOGS IN REVIEW

Mo-Max Handbook

The Cleveland Twist Drill Co.,
1252 East 49th St., Cleveland 14, Ohio

The new fifth edition of the Mo-Max Handbook, prepared by J. V. Emmons, metallurgist of this company, is now available for distribution. Included among its contents are details on the standard and special analyses of Mo-Max, brief instructions on forging, annealing, hardening, quenching, tempering; the new sub-zero treatments; tool performance; comparison of microstructures of Mo-Max and 18-4-1 high speed steels; and Rockwell hardness curves and other informative charts.

In announcing this new edition, the company also points out that the Firth-Sterling Steel Co., McKeesport, Pa., is now licensed to market Mo-Max steels under the trade names Hi-Mo and Super Hi-Mo. The complete list of Mo-Max licensees, with their brand names, is as follows:

Allegheny Ludlum Steel Corp.—LMW
Bethlehem Steel Co.—Bethlehem HM
Braeburn Steel Co.—Mo-Cut
Canadian Atlas Steels, Ltd.—Mohican
Carpenter Steel Co.—Star Max
Columbia Tool Steel Co.—Molite 8
Crucible Steel Co. of America—Rex T-Mo
Firth-Sterling Steel Co.—Hi-Mo
Henry Disston & Sons, Inc.—Di-Mol
Halcomb Steel Co.—Rex T-Mo
Jessop Steel Co.—Mogul
Latrobe Electric Steel Co.—Tatmo
Simonds Saw & Steel Co.—S.T.M.
Universal-Cyclops Steel Corp.—Mo-Tung
Vanadium-Alloys Steel Co.—8-N-2
Vulcan Crucible Steel Co.—Vul-Mo

Mention R938 When Writing or Using Reader Service.

Tangent Bender

Struthers Wells Corp., Titusville, Pa.

A new 16-page bulletin, pictorially describing in detail many of the suggested products that can be produced on the improved Tangent Benders, has just been released by this company. The bulletin provides comprehensive data on the single wing, double wing and the newly developed stretch wing Tangent Bender machines, with important engineering information, special features, product shapes and designs that can be formed in a single operation.

The manufacturer states this bulletin is a "must" for design engineers and those associated with metal products, because so many new uses for the varied metal working industries have been discovered and rapidly developed since the introduction of the hydraulic Tangent Benders about a year ago. It is estimated that approximately 90% of all postwar refrigeration cabinets will be produced by this method.

Truck bodies, radiator covers, metal desks, chairs, cabinets, tables, complete kitchens and bathrooms, freezer cabinets, washing machines, laundry trays, radiant heaters, and many other common products that can be formed on Tangent Benders are shown in the bulletin.

Mention R939 When Writing or Using Reader Service.

Lubricant-Retaining Bearings

Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

Great engineering flexibility, in the selection of bearing sizes in standard shapes, and in various powder metal materials, is set forth in this new 20-page size list.

Through possible variations in the lengths of the numerous sizes listed, as well as through the selection of material best adapted to every application from a variety of powder metal compositions, in both bronze and iron structures, with or without impregnated lubricant, hundreds of thousands of parts can be specified from this size list.

In addition to tabulations of graduated dimensions, segregated for quick reference on sleeve type and flanged bearings, other data on self-aligning bearings, thrust washers, bar stock and special shapes are included.

Mention R940 When Writing or Using Reader Service.

Bronze Casting Alloys

American Manganese Bronze Co., Philadelphia, Pa.

This new 48-page reference book on bronze casting alloys gives general information regarding composition, characteristics and applications of many of the common or typical alloys. The book will help the engineer or designer in the selection of the right alloys for any general application.

Mention R941 When Writing or Using Reader Service.

Detergents

The Optimus Detergent Co.,
172 Church St., Matawan, N. J.

A new line of industrial metal cleaning materials, designed to cover a wide range of specific applications, is announced and described in this four-page leaflet. Emphasis is placed on the use of the proper detergent in conjunction with the correct cleaning practice. The new products are announced as available in alkaline, acidic, solvent and emulsion types.

Mention R942 When Writing or Using Reader Service.

Porcelain Enameling Handbook

Porcelain Enamel Institute,
1010 Vermont Ave., N.W., Washington 5, D. C.

This 20-page technical handbook titled "Design and Fabrication of Metal Parts for Porcelain Enameling" is prepared as a guide for production men not familiar with the requirements of the porcelain enameling process. The handbook is also a summarization of essential basic principles for those within the industry.

Following a foreword which explains the basic properties of porcelain enamel, the booklet is divided into four sections: 1. Selection of Materials; 2. Design Factors; 3. Fabrication; and 4. Definition of Porcelain Enameling Terms.

Section 1 discusses the desirable qualities for base metals to be used for porcelain enameling purposes, as well as the kinds of frit to be used. Section 2 covers the proper gages of metal recommended for various uses and the size of parts desirable for best results.

Section 3 describes and illustrates handling the metal, shearing the blanks, punching and notching, working the metal, welding methods, drawing operations and dies, lubricants, assembly of parts and cleaning before coating. Section 4 provides a valuable list of definitions for the production man.

Mention R943 When Writing or Using Reader Service.

Technicolor Film on Arc Welding

Lincoln Electric Co., Cleveland 1, Ohio

A new technicolor sound motion picture titled "Magic Wand of Industry—Arc Welding" portrays the dramatic progress of arc welding from its beginnings to its present vital wartime role. There are also scenes which take the audience into the welding world of tomorrow. Produced at the request of the U. S. Bureau of Mines which is releasing the picture under the title "A Story of Arc Welding," this 25-minute presentation, filmed under the technical direction of Lincoln welding engineers, was staged and photographed in practically every major industry including airplane factories, shipyards, refineries, steel mills and Shasta Dam. Primarily educational, the film graphically presents the fundamentals of arc welding, the electrical circuit, and the types of welded joints.

The film is available in 16-mm. and 35-mm. prints to business groups, technical societies, schools and colleges and industrial plants at no charge except transportation.

Mention R944 When Writing or Using Reader Service.

Seam Welders

Sciaky Brothers, 4915 West 67th St., Chicago, Ill.

Series PMM-1 180 KVA seam welders are described in this 24-page bulletin No. 113-A. General information and tooling data are included in addition to actual machine specifications. Principles and applications of electric resistance seam welding are cited with illustrations used profusely.

Mention R945 When Writing or Using Reader Service.

Beryllium Copper

Beryllium Corp. of Pa., Reading, Pa.

This 16-page catalog gives considerable information on the casting characteristics of beryllium-copper. It is freely illustrated and presents valuable information on the physical properties of some beryllium-copper alloys, recommendations on heat treatment, machining practice, and descriptions of some parts that have been made in beryllium-copper during the past year.

Mention R946 When Writing or Using Reader Service.

Oil Burners and Ovens

W. S. Rockwell Co., 50 Church St., New York 7, N. Y.

This company has issued two new catalogs devoted to industrial oil burners and ovens. Various features of the oil burners are described in this 12-page booklet using many charts and illustrations. The burner is a simple, rugged combustion unit, operating with low pressure air, suitable for any industrial furnace, oven, heater or boiler where the maximum service is desired. It is recommended where close control of temperature and atmosphere are important.

The booklet on ovens is a guide for the selection of the correct oven for baking, drying and curing.

Mention R947 When Writing or Using Reader Service.

Metal Cleaning Before Brazing

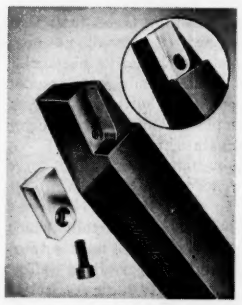
Kelite Products, Inc., Los Angeles 1, Calif.

A scientific process for the cleaning of metal surfaces before low temperature brazing with silver alloys is described in this illustrated leaflet. Pointing out that brazing with silver alloys requires clean metal surfaces upon which to work, the article adds that the presence of oil, grease, oxides, scale or inert small particles will interfere with a good brazed joint since the molten alloy will not wet and flow over an unclean surface. The cleaning procedures described in this leaflet are the result of research and experimentation and should be helpful to anyone concerned with joining operations.

Mention R948 When Writing or Using Reader Service.

"Universal" Tool Blanks

Kennametal, Inc., Latrobe, Pa.



These Kennametal "Universal" tool blanks, Style S-000, are rectangular in shape, with 12° clearance angle formed on one long edge. They can be used to make many different types of tools, by setting them into open-end recesses. They are available in all recognized standard sizes, having thicknesses of $\frac{1}{8}$ in. or more. Many sizes are stocked in steel-cutting grades. Catalog sheet 23-A, giving complete particulars, is now available.

Mention R949 When Writing or Using Reader Service.

Seamless Tubing Tolerances

Tube Reducing Corp., Wallington, N. J.

This 16-page bulletin on Rockrite high-quality cold-reduced seamless tubing should be of interest to design engineers and production machine shop executives. It is information pertinent to the production of metal parts of generally cylindrical form that can be made from tube stock, such as ferrules, bushings, spacers, sleeves, small pressure cylinders, bar and roller bearing races, hollow shafting, etc.

The bulletin explains in detail the reduction method by which Rockrite tubing is made, and it gives basic information about the principal methods used to size hot-rolled tubing, including a discussion of customary tolerances and the new, closer tolerances as to outside diameter, inside diameter, wall thickness and concentricity of bore obtainable by the Rockrite process. The bulletin is a convenient reference work and contains handy information on tolerances.

Mention R950 When Writing or Using Reader Service.

Welding Technique

Ampco Metal, Inc., 1745 South 38th St., Milwaukee 4, Wis.

New literature on Ampco-trode coated aluminum bronze weld rod is announced. "Ampco-trode Welding Technique" is a 32-page booklet describing the various methods of welding with these electrodes. Sections are devoted to metallic arc, carbon arc, and oxy-acetylene welding. The book is well illustrated with diagrams and pictures of welding applications. This bulletin is known as W-2.

Another bulletin W-3 known as "Ampco-trode Electrodes" is an eight-page 8½x11 bulletin describing in detail the five standard types of Ampco-trode aluminum bronze weld rods. Chemical composition and physical properties are given, together with information on the uses of the various types.

Mention R951 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Index to Advertisers

	Page
Buehler, Ltd.	9
Cherry Rivet Co.	14
Clark Co., Robert H.	13
Continental Machines, Inc.	12
Du Bois Co.	7
Electric Furnace Co.	10
Electro-Alloys Co.	11
Hevi Duty Electric Co.	11
Kennametal, Inc.	13
Lindberg Engineering Co.	9
MacDermid, Inc.	7
Precision Scientific Co.	9
Quaker Chemical Products Corp.	5
Rustless Iron & Steel Corp.	11
Ryerson & Son, Inc., Joseph T.	7
Stanwood Corp.	11
Tinnerman Products, Inc.	14
Toledo Scale Co.	9
Turco Products, Inc.	5
Warner Electric Co.	7

Advertising Representatives

Cleveland 3 — A. P. Ford
7301 Euclid Avenue
Phone: Endicott 1910

New York 18 — Robert S. Muller
55 West 42nd Street
Phone: Chickering 4-2713

Los Angeles 13 — Don Harway
816 West 5th Street — Phone: Mutual 8512